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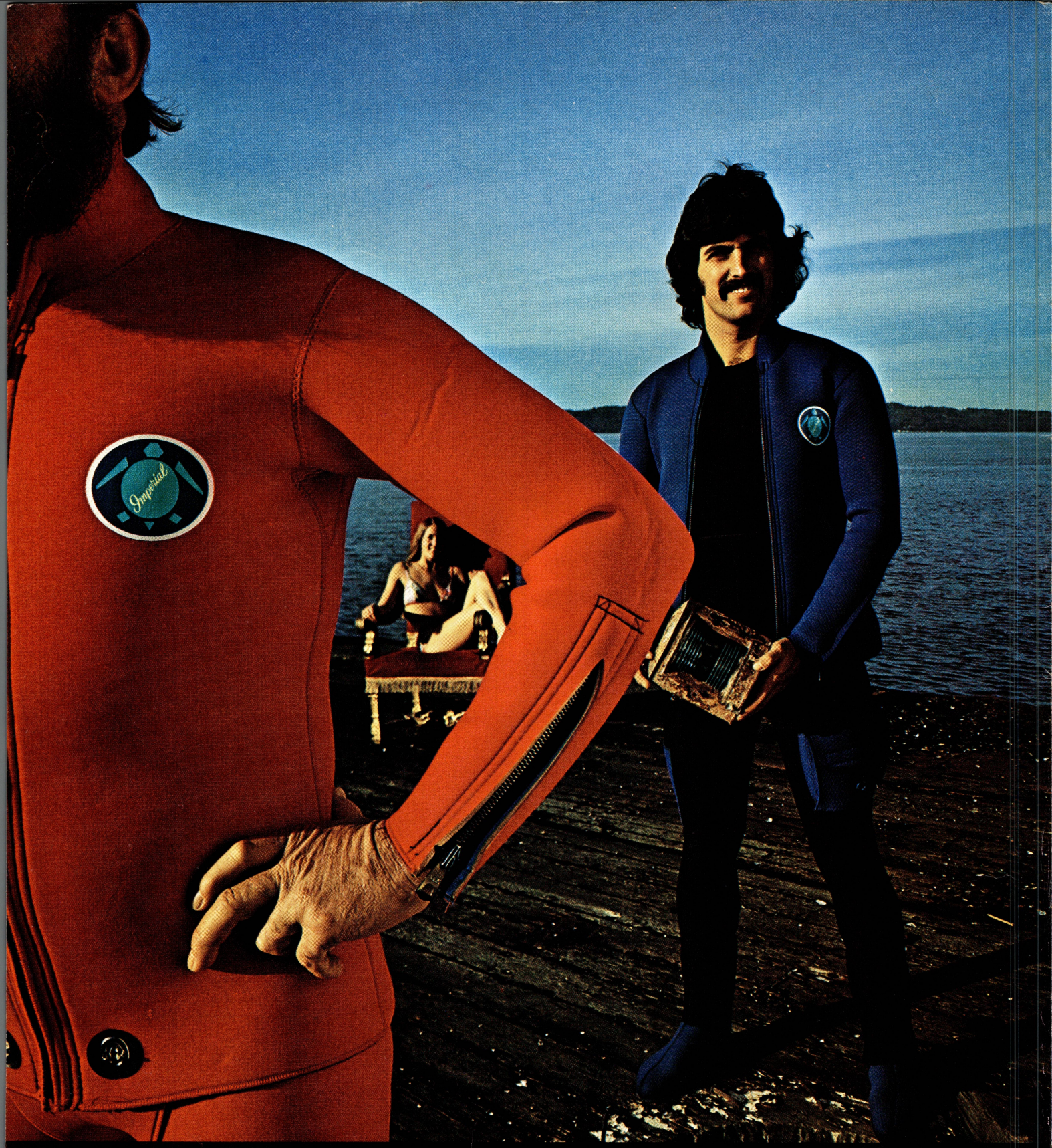
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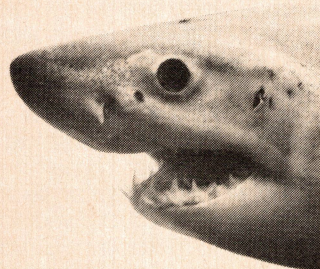
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NIKONOS II



skin diver

VOLUME TWENTY-THREE NUMBER TEN



28/Shark Sense?



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Cover – Diver Bernie Campoli reaches out to touch a giant purple striped jellyfish which he encountered in about 10 feet of water off Anacapa Island, California. Photographer Jack McKenney took the picture with a Nikonos camera with a 21mm lens, Subsea strobe, and Kodachrome X film. For more about the purple striped jellyfish see story on page 54.

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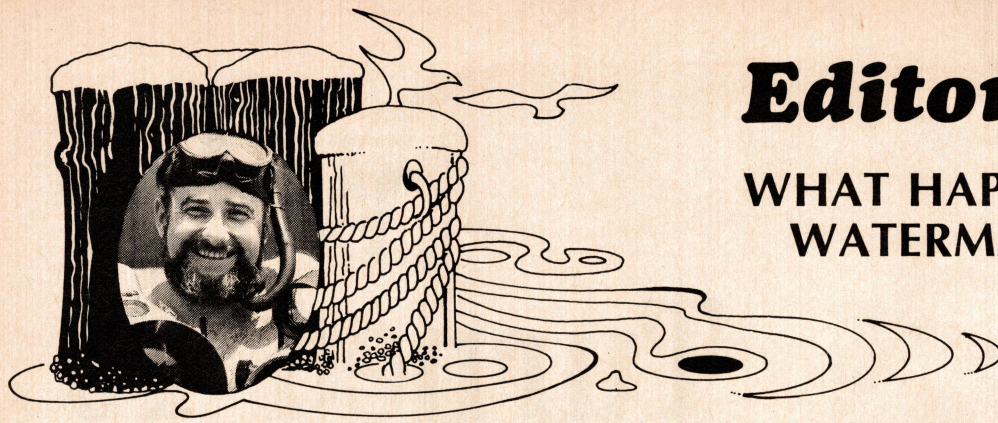
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Editorial

WHAT HAPPENED TO WATERMANSHIP?

by the Publisher

Something is drastically wrong with this country's present system of diver training. There is mounting evidence that a large portion of this year's graduating scuba students are coming out of their classes ill prepared for open water diving. Diving accidents and scuba fatalities are on the increase, with a majority of victims being so-called "certified divers." Many of the accidents were simple cases of poor watermanship and inadequate physical conditioning.

At one point this past summer things got so bad that the Charter Boat Owners' Association of Southern California issued a protest letter to all instructor associations in the U.S. Claiming responsibility for the transportation of over 20,000 divers annually, this organized group of dive boat operators went on record expressing their concern over the deterioration of water skill performance among this year's crop of certified divers. They pointed out a definite correlation between the steady increasing rate in diving accidents and the progressive decrease in their passengers' watermanship abilities. In their opinion, the 1974 certification card holds considerably less value than cards issued several years ago. There was even talk about bringing in a federal agency to control and license diving schools . . . certainly an unwanted solution which could deliver a devastating blow to our sport.

The instructor associations of this country have certainly done their part in establishing guide-lines and basic minimum requirements for training and certification. The YMCA requires a 300-400 yard swim exercise as part of every basic scuba course, plus a long list of other water skill requirements. PADI requires a 400 yard swim with all scuba gear on; NAUI requires a 440 yard swim with snorkel gear in ten minutes or less, and so on. The skills and tests for watermanship are clearly defined by all of the instructor associations.

However, many instructors faced with the economic pressures of rising costs have begun to cut corners. Scuba classes are overcrowded, pool exercises are cut to the minimum or less, and students are rushed through their course in assembly line fashion. Many of today's scuba students are not taking watermanship and physical fitness seriously because their instructors do not take it seriously. It is a problem of general attitude.

Let's not kid anybody . . . skin and scuba diving are definitely physical sports. All participants must be in good physical condition, have a knowledge of basic swimming skills and feel at home in the water. It should be remembered that the basic swimming skills represent the *ultimate* safety back-up when all other dive equipment fails or becomes lost. Watermanship is the basic foundation of our sport, and should be treated as the top priority item in every diving course.

As a rule-of-thumb we can say that any certified scuba diver should be able to perform a quarter mile (440 yards) swim. This is the *minimum* level of swimming fitness required for open water excursions. This swim skill requirement should not be considered a one-shot test given once during a dive course, but instead a basic exercise which is performed every time the class has a pool or open water session. Development of this skill should be done gradually over the entire length of the course. In addition, special emphasis should be made by the instructor that every certified diver maintain the minimum level of watermanship performance with a quarter mile pool swim three times a week. Unlike the mind, muscles have no memory and thus require a continual program of conditioning in order to remain fit. The same holds true for all of the other basic skin and scuba water skills.

The student's appreciation for watermanship begins with the instructor. He must set the example by smoothly de-

monstrating all water skills required and performing them far better than his students. Since the instructor is responsible for the lives of all of his students, he should maintain a far higher degree of physical fitness. Any diver who calls himself a certified instructor should be able to swim a half mile (880 yards) on the surface with snorkel gear or scuba gear. If he cannot perform this simple physical requirement because of sickness or poor physical conditioning, he should not be teaching a class.

The rationale that diving should be "fun" instead of a Marine Corps-style boot camp is a weak and unacceptable argument. Swimming can be enjoyable and relaxing — once you've developed the physical fitness to handle it. Basic swim skills should not be regarded as a chore but rather as a vital requirement for the diver's safety. It's like taking out your own life insurance policy, with the premiums being only a small amount of time spent in weekly pool workouts.

It must also be said that not all of today's scuba courses are bad. In defense of the conscientious instructor who continues to maintain a high standard of scuba training and watermanship, we should point out that over 60 percent of the classes are turning out well qualified divers. However, it may be somewhat of a surprise to these fine instructors to learn that over 50 instructors in the country are now under investigation for poor training methods and violations of the minimum course standards.

The crackdown on poor standards and teaching quality has just begun and all of the associations are now tooling up for a more rapid, efficient method of dealing with violators. It is dearly hoped that the borderline instructors will reevaluate their course content and training methods before they come under fire from their peers. It's time to get back to basics and put watermanship back into diver training. 🐬



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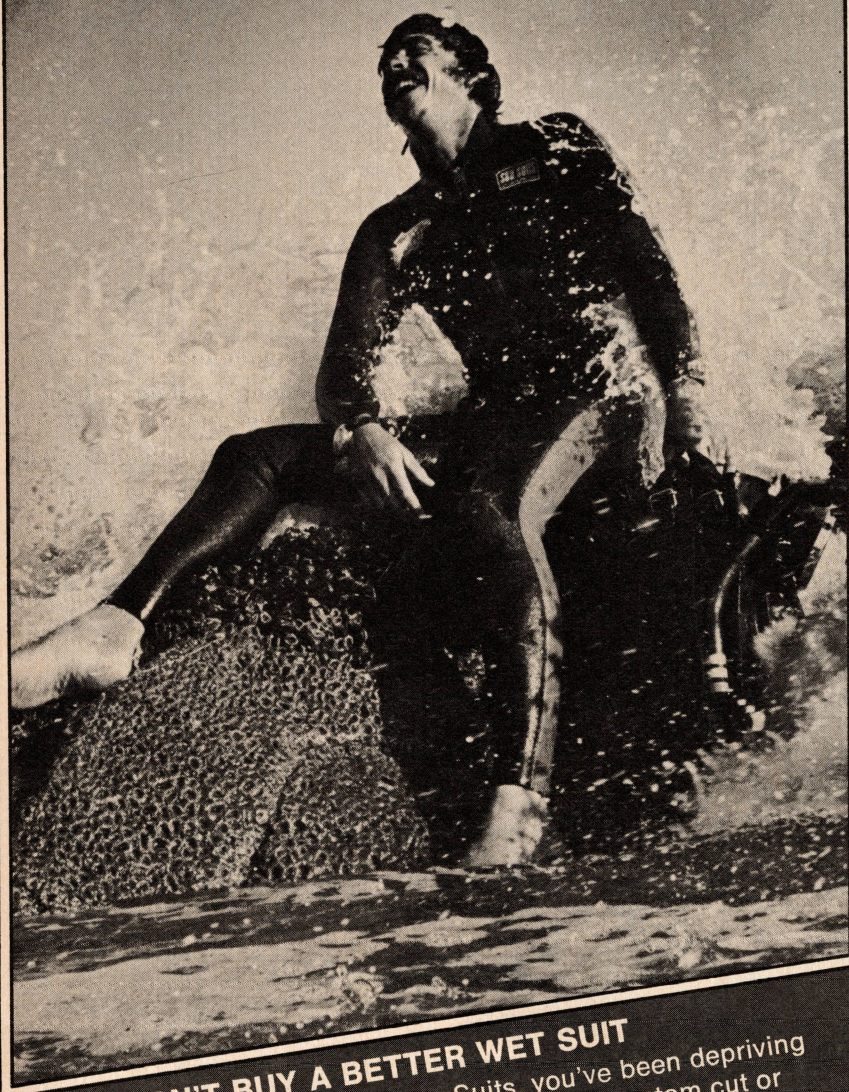
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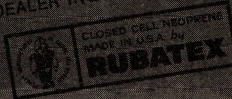
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DEALER INQUIRIES INVITED



... The Women Divers' Association is a new organization designed to establish communication between women divers on a national level. To this end WDA is publishing a monthly newsletter to provide a clearing house to share experiences — what are women divers doing now? What have they done in the past that we can learn from? What can we do in the future to improve our sport?

WDA is also researching by gathering statistics on how many women divers there are now and what their needs are. If fewer women sign up for scuba diving classes than men, we'd like to know why. If more women drop out of classes than men, we'd like to know why. If more women drop out of the sport after they complete a diving course than men, we'd like to know why.

Based on these statistics, WDA would like to clearly define the problems women face in diving instruction, dive shop orientation, diving equipment and women's options as sport divers. We feel that we can, and should, define those problems with the sole intent of clarifying the issues, not criticizing any one or any group of divers.

We would like to create a dialogue within the whole diving community about how the sport can grow, become safer and more fun for all divers. We would like to work with existing groups to offer suggestions about how instructors can try different approaches when training women in their classes; how manufacturers can alter their equipment designs to meet the needs of women divers; how dive shops can market existing equipment to increase their sales among women divers; and how dive clubs can organize activities that will encourage more participation with women divers.

The Women Divers' Association is looking for positive support, creative ideas, documented facts, personal opinions... in short, communication. Please contact them at P.O. Box 38504, Los Angeles, California 90038.

THE WOMEN DIVERS' ASSOCIATION
LOS ANGELES, CALIF.

... I have read with interest and some concern the letter by Doctors C. Scott Johnson and James F. Fish in regard to their negative results with striped wet suits as a shark deterrent. My concern is that a simple useful principle for reducing the probability of shark attack will be obscured in a muddle of scientific controversy and some irrelevancy.

First, there is the matter of pattern. When one considers the principles of disruptive coloration, oblique, vertical, and cross hatched patterns are irrelevant.

(Continued on Page 10)

skin diver

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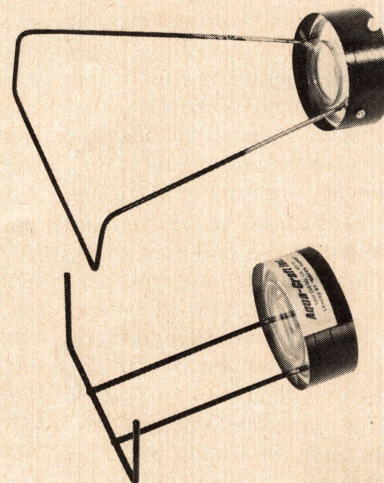


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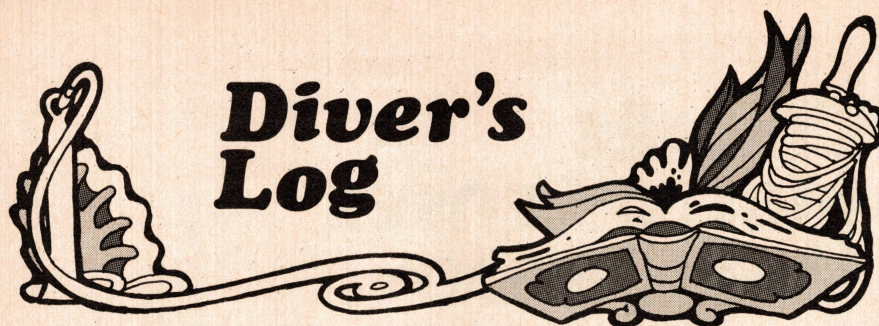
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Diver's Log

THE C-CARD MILL

BY GUY S. WARNER

How easy it is to plod along teaching the same old basic scuba course year after year, never changing much and never trying anything new. Yes, it's easy to go with what we are familiar and comfortable and a little more difficult to try something we have never attempted before. How many basic scuba courses have you taught in the past few years, and how many students have you certified? Now, the important question: How many intermediate, advanced, or specialty courses have you offered for the basic divers you have certified? If your answer is none, then you are definitely caught up in the C-card mill.

You say that you are kept so busy by the demand for your basic course that you just do not have time to offer any other course or activity? This would seem to be a very valid reason, and one that I have proclaimed myself. For a few other reasons that also seem to be logical in support of maintaining the status quo, check these out: (1) There are not enough instructors around to teach the basic course. (2) The advanced diver courses are too long, overly complicated, and cost too much to run. (3) There are not enough certified divers interested in other courses or sponsored activities. (4) People are not willing to pay for additional courses or activities. These are only a few of the seemingly sound arguments that I have heard for sticking with the same basic course year after year.

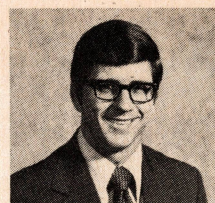
Let's take a good hard look at some of these reasons or arguments in terms of where we as instructors, and sport diving programs in general, seem to be heading. First, the number of scuba instructors in all of the instructor organizations is increasing yearly. Quite naturally, the new instructors will be seeking opportunities to teach scuba courses and most will begin by offering the basic certification course. Look around you. See any new faces in the instructor ranks? Any new courses in town? So far, the demand for basic certification courses has continued

to increase and most of the instructors desiring to teach the basic certification course have found students desiring the course. But, what about the future? Already in some areas the competition for students to fill the basic diver courses is stiff. When will we reach the saturation point for these courses?

The other reasons deserve a closer look too. Admittedly, many of the original advanced diver programs were not too practical and were not really serving the purpose which they were intended to fulfill. They have been evolving, however, and the second generation of advanced diver courses looks much better than the first. Many instructor organizations are also offering intermediate diver courses which are designed to give the neophyte diver supervised diving experiences and to build his confidence in the water. Specialty courses such as underwater photography, cave diving, and others are also gaining in popularity.

Each year the number of divers certified continues to grow by leaps and bounds. A large number of these divers would appreciate reasonably priced courses, activities, and diving trips to extend their competency, confidence, and enjoyment in the water. Most of the divers who have completed the basic certification course do not want to let their diving equipment sit in the closet. Many of them, however, are not quite ready to strike out on their own after only the minimum of one or two scuba dives which are the usual number of check-out dives offered in the basic courses. If an instructor will offer an intermediate diver course, advanced diver course, specialty courses, or even sponsored diving trips, and not charge an arm and a leg for these courses and activities, he should find plenty of takers.

What may be some of the real reasons why more instructors do not offer a variety of courses and diving activities? I suspect that the real reasons, even though we may be somewhat reluctant to admit



Guy S. Warner is currently working as an eighth grade physical science teacher at Largo Junior High in Largo, Florida. In 1966 he became a certified YMCA scuba instructor while attending Michigan State University, and has been actively teaching courses in skin and scuba diving for eight years. While working on a Master's Degree in physical education, he helped initiate and develop an accredited diving course and program at Florida State University. For the past three years he has served as state director for the YMCA scuba program in Florida, and has served on the staff and helped direct numerous YMCA Scuba Instructor Training and Certification Institutes. His main interests in diving are underwater photography and diving instruction.

it to ourselves, are among the following:

- (1) Inner fear of failure, or feeling inadequately prepared to meet the challenge.
- (2) Reluctance to put in the extra time necessary to develop a new preparation or activity.
- (3) Too much trouble to organize, develop, and promote a new course.
- (4) Not willing to risk an established reputation by offering something untried and new.
- (5) No strong motivation to change.

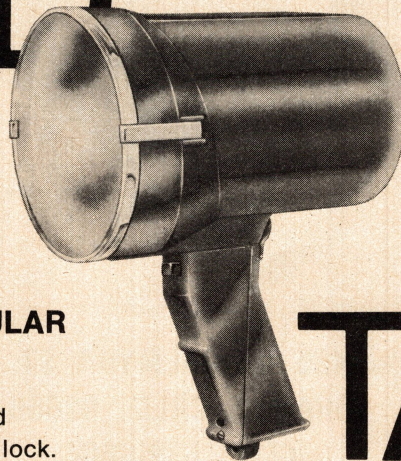
These are the all too human traits which most of us possess that tend to make us a little conservative and resist change. It is simply easier and less risky to keep plodding along with business as usual.

Although it may seem more difficult to stick your neck out a little and try to develop a new course or diving activity, the potential rewards far outweigh the difficulties you may encounter. Not only will you provide a valuable service for the divers who want to become more proficient in the water, but you will also expand your own horizons in diving. Offering something new is really stimulating after teaching the same course time after time. Developing the capacity and ability to teach a variety of courses also insures that you will be able to continue instructing when the number of basic courses exceeds the demand.

It is time for us as instructors to expand our horizons and offer a variety of diving courses and activities. There are plenty of ways to go, and a lot of satisfaction to be gained for the extra time and effort that must be expended. A little anxiety or concern about falling short of the mark can be beneficial. This feeling usually helps us to put forth a little extra effort to make sure this doesn't happen. It is only when we let this concern be overwhelming that it is harmful.

Stuck in the grind of the C-card mill? If so, it is time for a change. Dive in, and after swimming around for awhile, you are likely to ascend to new experiences which are stimulating and fulfilling.

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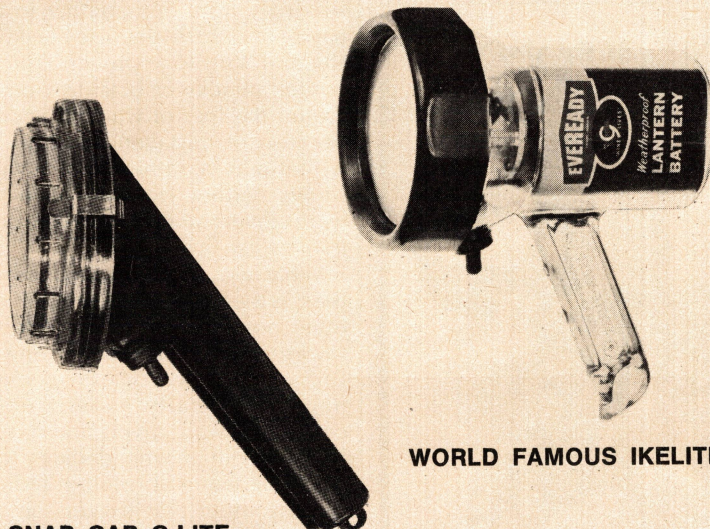


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(Continued from Page 6)

Only broad, high contrast bands running at right angles to the axis of motion can be expected to be effective. It is unlikely pure chance that this same pattern is exhibited by the one creature that spends most of its time right in front of the shark's nose, the pilot fish.

Reactions of sharks to silhouettes, mannequins, and dummies are also not very instructive. Reef animals live in a very complex sensory environment and they are quite sophisticated in their sensory responses. Models have been used with good success in much of the basic behavioral work on fishes, but this has largely involved freshwater species coming from simple environments. In using models with reef fishes and sharks, my results have generally been disappointing. Simple curiosity is most often the result rather than fear, aggression, courtship or other behavior which the models are supposed to elicit. In the instance at hand, a strange object moving and emitting sounds, including heart-beat, is apparently alive and possibly dangerous — to be approached with caution; whereas an inert object with no indication of life is harmless and possibly edible.

I cannot comment upon the reaction of blue sharks, as they are outside my realm of experience. I know well however, the three reef species from Eniwetok mentioned by Johnson and Fish. They differ strikingly from one another in their behavior toward divers. The blacktip is very shy and hard to approach. The only recorded attacks of blacktips on humans are on the legs of waders, undoubtedly because of mistaken identity. The reef whitetip is a rather docile shark that shows neither fear nor aggression towards divers, and I know of no attacks on humans by this species.

What we are really concerned with, then, is the behavior of grey, silvertip and other potentially aggressive reef sharks toward human divers wearing banded suits as specified. These species, fortunately, normally exhibit only wary curiosity toward divers and it is only the rare individual who decides to attack. Anything that will result in reducing the sensory input that triggers an attack is worthwhile, and vision is very important in these animals in triggering, and especially in directing an attack. There is good evidence they have contrast enhancing mechanisms in their visual systems and a high contrast's disruptive pattern can do much to confuse this.

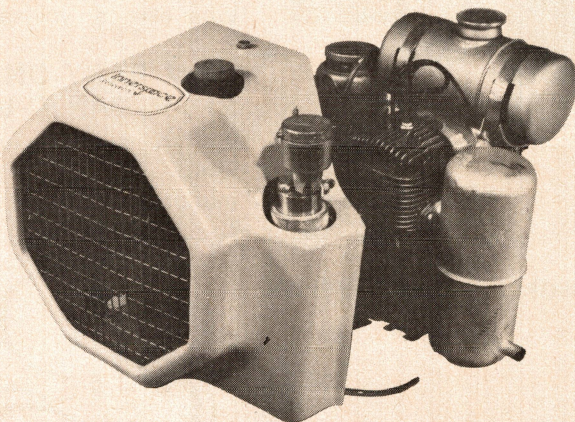
A striped suit is not a magic "invisible protective shield," nor do sharks flee in terror from it. I have been using a striped

(Continued on Page 13)

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October 4-6

NAUI 6th International Conference on Underwater Education, San Diego, Calif. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

October 19-20

Seaspace '74, Rice Hotel, Houston, Texas. (Contact: Ted deWerd, Seaspace Chairman, Box 27035, Houston, Texas)

October 26-27

NAUI IQC, San Diego, Calif., (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

November 9

NAUI Underwater Symposium & Film Review, Philadelphia, Pa. (Contact: NAUI Mid-Atlantic Branch, P.O. Drawer C, Deepwater, N.J. 08023)

November 23

12th Annual UPS Film Festival, Santa Monica Civic Auditorium, Santa Monica. (Contact: Santa Monica Civic Auditorium, 1855 Main St., Santa Monica, Calif.)

November 23-24

3rd International Skin Diving Film Competition, Berlin. (Contact: Robert Haberling, D 1000 Berlin 37, Heimat 33)

December 7-8

NAUI Workshop, San Diego, Calif. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

January 18-19

NAUI IQC, San Diego, Calif. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

Jan. 21-22, 1975

5th International Diving Symposium, Municipal Auditorium, Morgan City, La. (Contact: Mr. L. Wilson Trahin, Chamber of Commerce, P.O. Box 709, Morgan City, La. 70380)

February 15-16

NAUI Workshop, San Diego, Calif. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

April 12-13

NAUI IQC, San Diego, Calif. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

June 14-21

NAUI ITC/IQC, San Diego, Calif. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif.)

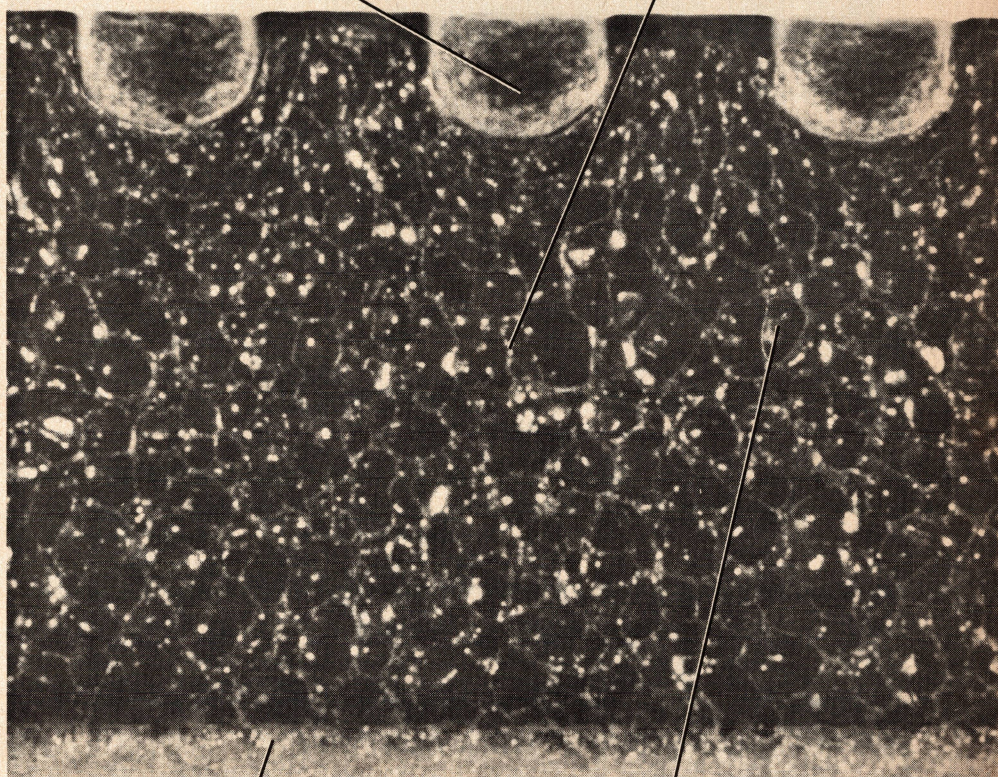
July 6-18, 1975

Vlth Symposium on Underwater Physiology, Hotel del Coronado, San Diego. Jan. 31, 1975, deadline for receipt of contributed abstracts. (Contact: Secretariat, Vlth Symposium on Underwater Physiology, 9650 Rockville Pike, Room 200, Bethesda, Md. 20014)

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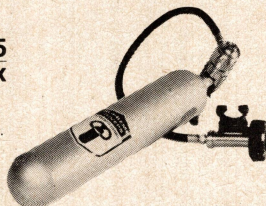
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YMCA Scuba Instructor Certification Institute, Indianapolis, Ind. (Contact: Tom Haver, 6001 Compton, Indianapolis, Indiana)

September 30-December 6

NASDS College, San Diego. (Contact: NASDS Educational Division, 1214 Rosecrans, San Diego, Calif. 92106)

October 7

Professional Diving Instructor Course, Monterey, Calif. (Contact: Ed Brawley, 598 Foam St., Monterey, Calif. 93940)

November 1-3

YMCA Scuba Instructor Certification Institute, Greenville, S.C. (Contact: C.B. Carter, P.O. Box 628, Brevard, N.C. 28712)

December 6-8

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YMCA Instructor Institute, Cozumel, Mexico. (Contact: Jan McGinnis, 10010 Memorial #1413, Houston, Tex. 77024)

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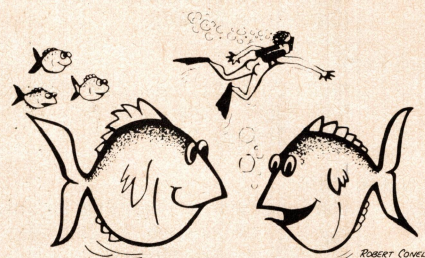
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March 29-30, Apr. 19-20, May 10-11, 1975

YMCA Instructor Institute, Tulsa, Oklahoma. (Contact: Ray Anderson, 1724 Elm, Lawton, Oklahoma 73501)



"Just one nip in the right place would stop all this streaking."



(Continued from Page 10)

suit consistently for a year and a half, day in and day out diving in the Tasman Sea, Coral Sea, and around New Caledonia, the New Hebrides, the Solomon Islands and New Zealand. Other divers with me almost invariably wore ordinary black wet suits. Occasionally, the results were dramatic as described in Wade Doak's article. More often, sharks were just more wary and stayed a little further away from me than from the other divers. Also grey sharks showed much more tendency to simply move away when approached by the striped wet suit rather than begin their characteristic agonistic display.

Considering the amount of time in the water, the range of conditions, locations, and seasons involved and the total number of observations on which my conclusions are based, I suspect the negative results reported by Johnson and Fish are either a result of their experimental approach or possibly a failure to notice subtle but important behavioral differences through looking for more dramatic ones.

There have been ten reported attacks by grey sharks in French Polynesia alone over the past ten years. For anyone doing

much diving in the tropical Indo-Pacific, these animals are a not inconsiderable danger and anything as simple as painting stripes on a wet suit that shows strong promise for reducing the probability of triggering an attack should not be lightly dismissed.

Finally, a comment on the "unpredictable behavior of sharks." This phrase has been used so often it has ceased to have any meaning. All animals are unpredictable and there is nothing to indicate sharks are any more or less so than other creatures. Like any creature, including man, if we understand something of the factors governing its behavior, we can influence it to our benefit. As for absolute predictability, we can't even predict the behavior of an amoeba.

WALTER STARCK NEW ZEALAND

... I don't believe David W. Rugen, "S.S. Mohawk," (July 1974) could have seen "piles of old jeeps and motorcycles" on a ship sunk in 1935. Motorcycles yes, but the "jeep" was built not much earlier than 1940-41.

DR. SAUL A. KAMMEN

BEDFORD, OHIO

... I belong to a diving club called the Rhodesian Subaqua club. I would like to correspond with some of your readers because we are land-locked and would like to hear how other divers get on with this great sport of diving.

ARTHUR ADEY NO. 4, 7TH AVE.
MABELREIGH, SALISBURY, RHODESIA

... Early one morning recently, I was walking along a popular diving beach, when I came across a swim fin that had apparently been cast upon the beach by the last night's high tide. At first, my attention was drawn only to the fin itself. It was one of the multi-vent types that retail for over \$20 per pair and are so popular with divers today. It looked like new and may have been in the water only that one time. One end of the ankle strap was free, an indication of how the fin was lost in the first place.

Then, I began to wonder about the hapless diver who had been wearing the fin. Most certainly, he was in the water near shore at the time, very likely in the surf zone. We can only guess at how serious the situation became for him, when all at once his control and mobility were markedly reduced. At least, his dive was spoiled and he went home unhappy about having to buy a replacement.

This instructor believes that the manufacturer was negligent in selling a fin whose strap could slip loose, resulting in loss of the fin and thereby placing the wearer's safety in jeopardy. To me, it seems very wrong that the burden is upon the diving instructor to show his students ingenious ways of modifying their new equipment so it is safe for use in the ocean.

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TRAPPED

A Diver's Rendezvous With Death In An Underwater Cave

By D. K. Tooker

The small sandy Laguna Beach cove glistened from the light of a huge Halloween moon. It was a perfect night for lobster diving. Bill, my partner, would be snorkeling on the surface while I searched the bottom for the California spiny lobster. I was wearing a full wet suit and scuba tank. The water's depth averaged only 25 feet and Bill was to act as the safety man in our "buddy system" and to hold the game bag.

"OK, Don," Bill advised, "if we work close to that rocky point, I'm sure we'll see plenty of lobsters."

"All right, Bill. You should be able to keep track of me by the glare that the light puts out." I was carrying a ten-cell, sealed Allen light, especially designed for underwater night operations.

We paddled out on the surface looking down through the effervescent water for the lobsters, which were supposed to be feeding more or less out in the open. The water was warm for October and the swells were fairly gentle. I flicked the light to say "goodbye" and headed down for the ledges that Bill had mentioned earlier. Tonight I was wearing a brand new aluminum single tank which I had purchased only the day before. The old tried-and-true set of double tanks I'd put together some 16 years earlier were getting a well-deserved rest. The single tank held about the same amount of air, but was much lighter and slimmer.

The beam from the underwater light revealed a new kind of beauty. Thousands of small fish glinted by and startled stingrays stopped motionless, blinded momentarily by the light's brilliance. A large rocky overhang appeared and I went deeper, entering a large cavern that opened into other shimmering corridors. The walls were covered with eel grass along with bunches of mussels, green and pink abalone, and several small lobsters. The latter were too small to be of legal size. Fascinated, I paddled effortlessly in and out of these miniature underwater aquariums.

Back on the surface Bill had kept track of my progress by the faint underwater glow until it had disappeared. There was no cause for alarm since the beam only carried 15 to 20 feet. His waterproof watch told him the dive was about 25 minutes along.

Down below I had finally found what we'd come after — a large six to seven pound lobster. He was a beauty! The only problem was that he kept propelling

himself further back into the rocks every time I'd get close. For ten minutes we played our underwater version of cat and mouse. Finally he was mine, flopping tail, ten legs, antennae and all. As I started up to the surface to find Bill, I discovered some disconcerting news: There was a very solid rock roof above instead of the open sea and, almost right on cue, the wave action picked up considerably, causing a strong surging action. A very unfunny thought crossed my mind as the lobster struggled against my side: I wonder just who's got whom?

A blind canyon ahead necessitated a reverse course. Cruising along the bottom was more difficult now because of the swirling sand. Visibility dropped to that of loose peanut butter. About 15 minutes of air remained, maybe 10. Ahead and up slightly were three routes — small openings leading somewhere, probably back to the original large cavern. Which one had I come in through? I picked the largest opening and headed in. The next instant I was slammed back against a rock wall by a surge so violent that it jerked the light from my hand and tore the mouthpiece from between my clenched teeth. The truth suddenly hit home . . . I was trapped! I was only a few moments from drowning.

The terrible realization of what was happening is almost impossible to describe. I guess it's like trying to regain your breath when it's been knocked out of you. The mouthpiece brushed against my head and I jammed it back into my mouth. Fortunately, the light had been secured by some nylon cord and it was retrieved quickly. For the record, I still had a death grip on Mr. Lobster. A quick recheck of values and he was free.

Full panic was approaching. I was gulping air at a frantic rate while trying to somehow hold on against the overpowering surge. There is no possible way a diver can talk underwater through a mouthpiece, much less at night in a cave, but I did anyhow. "Don, you're a gonner in a few minutes if you don't get ahold of yourself. Lose or break the light and that's it. Get your face mask knocked off and they'll find you sometime next summer. Ten minutes of air left, maybe less if you don't stop gulping it. So if you want to live, slow down and think."

That may not be word for word, but pretty close. Breathing lightly was the hardest thing to do, as any diver can attest. Not thinking about what might hap-

pen was equally difficult. I headed again toward the three openings only to be knocked back by the surge.

"There has to be a way out." The sound of my voice acted like a tranquilizer. I began to skip-breathe in order to conserve air. There were probably several ways out, all easily seen in the daytime; but the swirling sand at night made the small spotlight hopelessly inadequate. Surely my 20 years of diving experience would not desert me now. I wondered if it hurt to drown.

A quick swim of 20 yards retraced the earlier route back to the dead-end canyon. Near the bottom was a small hole some six to seven inches in diameter. Too small for me but not the light. I pushed it through and directed its beam upward — white, bubbly foam, which usually means the surface. I retrieved the light and dropped down to the very bottom looking for a hole. Beneath two huge rocks there was a small opening shaped like an inverted "V." It was a do-or-die exit, literally. The tank hung up as I got half way through. I was stuck! I couldn't reach back and release the tank, even if I'd wanted to. Panic started to well up.

"Not now, Don — you're that close . . ."

I exhaled every last molecule of air and squirmed like an eel. The tank suddenly broke free and I catapulted upwards, breaking the surface like a Polaris missile. I was in a small channel that led to the open sea. The moonlight was never more beautiful. In a few moments I was being helped from the surf. Bill's face showed his anxiety.

"Hey, where have you been? I lost track of your light almost 25 minutes ago. I came in because I figured you had, too. Have any luck, Don?"

Did I have any luck? I really didn't know what to say. What do you say?

"How'd that new single tank work," Bill asked, still not aware of what had nearly happened.

"It worked very well, Bill. Guess I've put some pretty deep scratches in it, though," I added.

And then it hit me just how well that new tank had worked. The older set, being doubles, were almost twice as wide and would never have allowed me to squirm through that tiny opening in the rocks. I know I'd have gone back and tried to play the "three openings" game again, and have surely ended up as just another diving statistic: Cause of death: drowning, accidental. 



PHILADELPHIA SEAHORSES U/W FILM EXPOSITION

The Philadelphia Seahorses have set Saturday, November 2, 1974, as the date

for their Ninth Annual Underwater Film Exposition and Seminars. All events will take place at the Irvine Auditorium of the University of Pennsylvania. Featured speakers will include Jean Michel Cous-

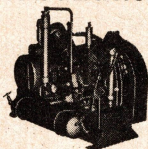
teau, creator of the Cousteau Group's Living Sea; Dr. Harold Edgerton, inventor of the strobe light; Dr. Eugenie Clark, author of *Lady and the Sharks*; David Doubilet, world renowned underwater photographer; Dr. George Benjamin, noted explorer of Bahamian blue holes; and many other special guests.

The seminar program is scheduled to begin at 10:30 am, and tickets are priced at \$2.50 per person. The evening underwater film exposition begins at 8 pm, and tickets are \$4. Combination tickets for both events are \$6. For tickets and information contact: Sandra Manning, 103 Hunter Road, Plymouth Meeting, Pennsylvania 19462.

During the evening film show, awards will be given for the Seahorses' annual underwater photography contest. Applications for the contest are being accepted until October 10, and interested parties should contact: Mary Jane Sellers at The Diving Bell, 681 North Broad Street, Philadelphia, Pennsylvania 19123 (telephone 215/684-2661).

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The package, available to November 1, provides four half-day scuba lessons and/or trips. All scuba diving equipment is provided during the lessons and diving trips. Also included are accommodations, breakfast and dinner daily, use of the resort's snorkeling equipment, free snorkeling lessons each day, use of the hotel's beach equipment, and use of tennis courts and raquets. Per person rates for the scuba plan are \$190 double occupancy, \$180 triple occupancy, and \$340 single. For additional information contact: Rockresorts, Inc., 30 Rockefeller Plaza, New York, N.Y. 10020.



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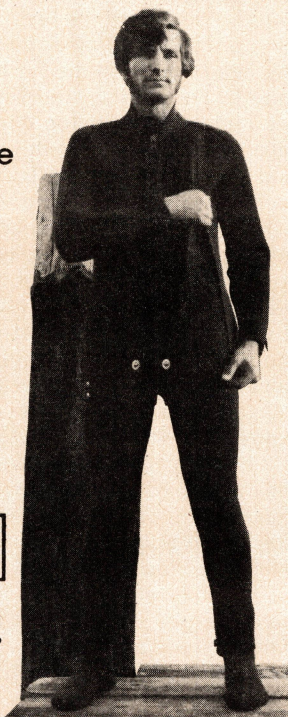


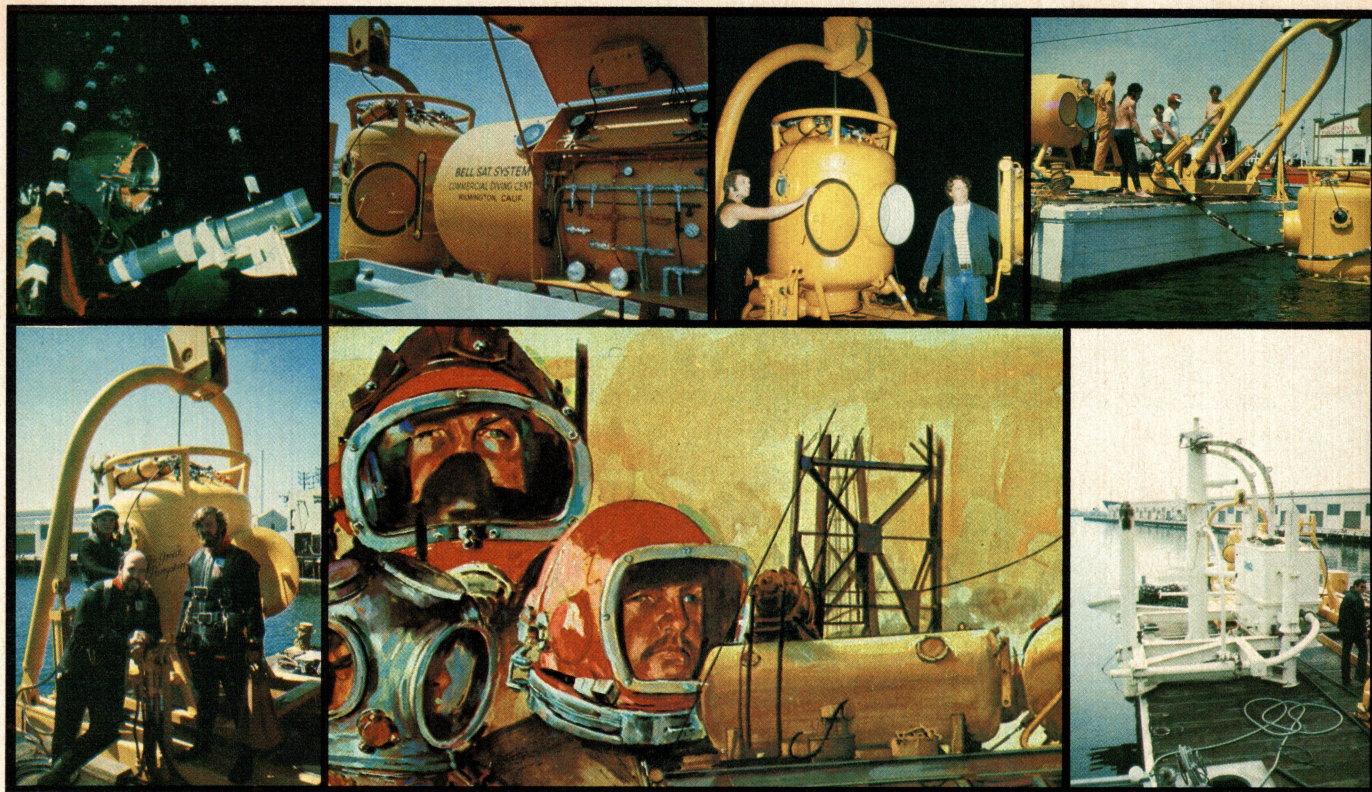
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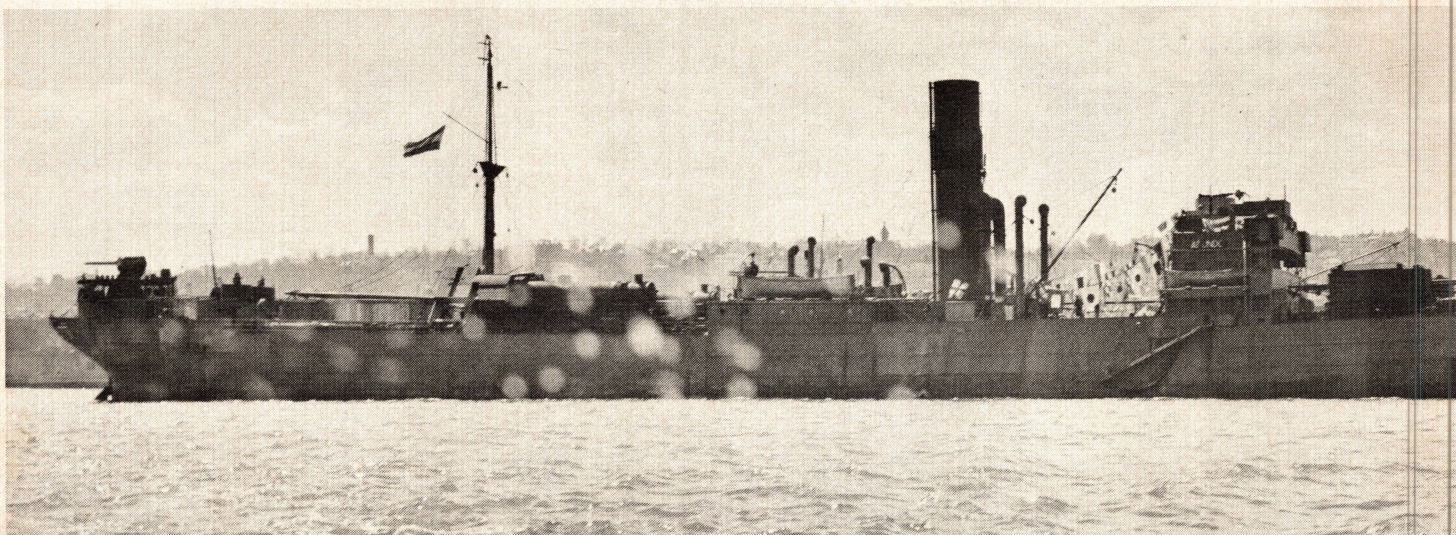
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Death And Destruction Ride The Wake Of A Torpedo Destined For

By Thomas Roach

April 28, 1942: at 9:30 am Chief Officer Akkerman, off watch at the time, was standing on the deck of his ship enjoying the warmth of the early morning spring sun when he saw something horrible materializing out of the depths a thousand yards off the starboard beam. The effervescent wake of a torpedo was leaving a track three feet wide on the surface of the water as it sped instant death and destruction toward the lumbering, unsuspecting freighter.

The 5079 ton Dutch general cargo carrier, *S. S. Arundo* had originally been built in 1930 as the *Petersfield* by the Northumberland Ship Building Corp. Ltd. of Newcastle, England. Three years and two owners later, the shelter deck steamer became the *Arundo*. Thusly named, she departed from the bustling wartime port of New York at 0500 hours on April 28, 1942, under the command of her Dutch Master, A. C. Trdelman, bound for Alexandria, Egypt via Capetown, South Africa.

The *Arundo's* cargo consisted of two huge steam locomotives and tenders, along with a number of trucks as deck cargo. In her hold was a mixed cargo of war materials including 123 trucks destined for the Allied Middle East Command in Africa. After clearing New York Harbor, the *Arundo* steamed into a bright clear day with only the slightest swells to disturb the tranquil surface of the ocean. She was to steer a course of 169 degrees true until a point was reached 14½ miles from Ambrose Light where the course was to be changed to 105 degrees. One mile later, at a speed of 10 knots, the *Arundo* sailed in front of the torpedo tubes of the lurking *U-136*.

The ship shook violently from stem to

stern from the tremendous concussion of the single torpedo exploding beneath the waterline directly under the bridge. The devastating explosion sent a column of water high above the stricken vessel and extensively damaged the starboard hull in the area of the number two hold, blowing the hatch covers completely off, and causing the hold to flood almost immediately. With the ship going fast, the 43 man crew began to abandon her using the lifeboats and rafts that had not been destroyed in the blast. Five minutes after the original attack, as the *Arundo* began to slide bow first beneath the waves, fate dealt the crew one last, horrible blow as one of the huge locomotives toppled off the slanting deck to fall among the men swimming in the cold water, killing four.

Six miles away, the American destroyer *USS Lea* was escorting two merchant ships from New York to Chesapeake Bay and sighted the *Arundo* sinking. Breaking off from her convoy duties, the *Lea* went to flank speed and sped to the scene of the action. Upon reaching the area of the sinking, the *Lea* commenced a thorough but unsuccessful search of the area for the U-boat.

The *Lea* then picked up the survivors who were drifting around on life rafts.

Now, 32 years later, divers from the Eastern Divers Association boarded the *Sea Lion*, a sturdy dive boat ably captained by George Hoffman. It was aboard the *Sea Lion* that we hoped to visit the remains of the Netherlands freighter.

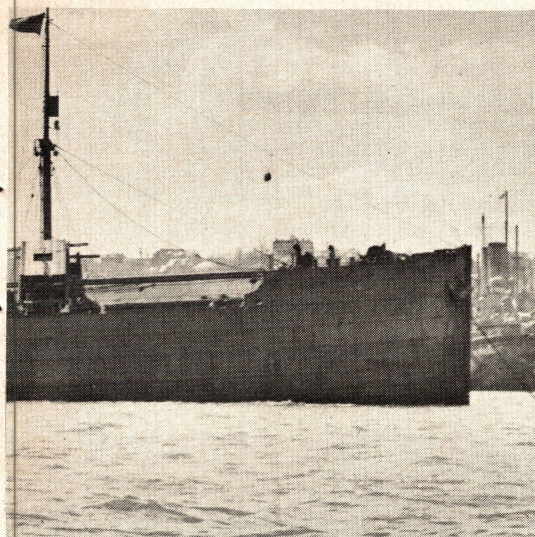
After an hour and a half of cautiously snaking our way through the heavy concentration of blue-fishing vessels and across the heavily traveled steamer lanes, we approached the deeper water that marked the beginning of New Jersey's

infamous "Mud Hole." Anxious eyes could be seen slowly searching the surface as the engine pitch changed and the boat slowed to begin scanning for the wreck. Twenty minutes of skillful evaluation of the scanner and depth recorder elapsed until a buoy went over the side.

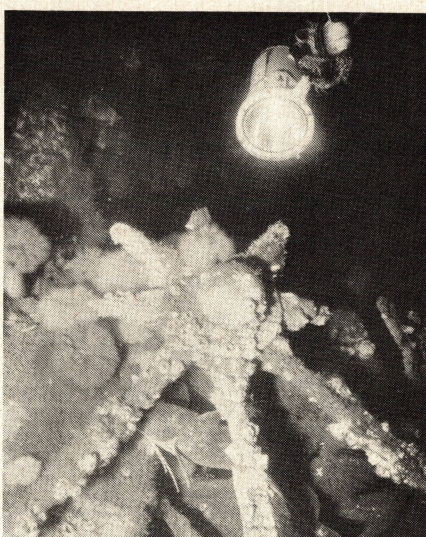
The first divers, now dressed, began to enter the water to swim to the anchor line and begin their descent. The coolness of the water I encountered as I rolled over the side was a welcomed relief from the stifling heat of a heavy wet suit baking in the hot summer sun. The top layer of water was gin clear and a deep shade of blue as my fins propelled me along the white nylon line, disappearing out of sight below me.

Passing through 70 feet, the water temperature dropped drastically and I began to notice a change in the color and texture of the surrounding water. The brilliant blue hues of the surface gave way to increasingly darker shades of green as I neared the wreck. Transparent, pulsating jellyfish were everywhere, trailing their fibrous, almost invisible tentacles behind them in lengths up to six feet. The ever present plankton, the basis of all life in the sea, seemed extremely heavy, not unlike a winter snowfall.

Thirty feet above the wreck I dropped through a school of silver blue, darting pollack, which quickly disappeared into the darkness of the water in the distance. By now my eyes had adjusted to the dim light that penetrated to this depth and I could make out details of the *Arundo* spread out in a panorama before me. My strongest impression of the *Arundo* had to be that of vastness; the size of this wreck is tremendous, covering over 400 feet of ocean bottom. I reached the grap-



photograph courtesy of Mariners Museum, Newport



photograph by Michael DeCamp

THE ILL-FATED ARUNDO

ple, which had caught in the stern boom and now lay flat across bent and twisted hull plates, checked to make sure that my decompression line was still in place on my doubles, then set off toward the stern of the wreck.

Moving along the edge of the wreckage, I passed over a brace of massive capstans still bolted in place on the slanting deck. Behind these now inert giants the remains of the stern deckhouse appeared out of the gloom. The corrosive effects of 31 years on the sea bottom had taken its toll on the steel walls of the structure. Jagged, gaping holes were everywhere, now homes for the small, colorful fish that darted back and forth with playful abandon.

A heavy coat of multi-colored sea growth covered the ceiling and walls of the corridor which led to the various interior compartments. I entered the first compartment very carefully, for the slightest unnecessary motion caused the accumulation of rusting metal to cloud the water with heavy, brown particles, reducing visibility to almost zero. I played the beam of my powerful light slowly around the walls of the room, coming to rest on a small porthole still bolted in place on the far wall. The splintered, jagged edges of the broken glass gave testament to both the violence of a torpedoed, sinking ship and the decades of churning, boiling undersea storms.

I retraced my way down the companionway to emerge again amidst the wreckage of the stern. Swimming aft over the collapsed decking, I came to a huge steering quadrant which jutted out from the wreck at a grotesque angle and framed the opaque form of the largest four-bladed propeller that I had ever

seen. Beyond the propeller, the rising form of the cutaway stern came into view, looming up from the bottom to form a large dark artificial overhang inhabited by lazy cod and an occasional lobster. The endlessly shifting sands of the ocean floor had formed small dunes that reduced the clearance between the hull and the bottom, making swimming difficult, so I moved out into the open and headed around the starboard side toward the bow.

As I swam along the rusting hull, my eyes searched the dimness of the surrounding water. I intently hoped to find and photograph the locomotives that the *Arundo* had been carrying as after deck cargo. Many times before I had tried to locate these iron mammoths, only to be foiled by poor visibility and disorientation on the wreck. This day, with the excellent visibility that prevailed, I had expectations of locating them by paralleling the starboard side of the wreck and searching off in the sand until I reached the amidships section.

I hadn't moved more than 100 feet from the debris in the stern when I saw the first locomotive, lying on its side only a few feet off the wreck, directly beneath the splintered stub of the rear mast. As I approached the engine, I realized why it had been so difficult to locate on days with murky water conditions. The size of this monster was tremendous. You could stand on top of it and not know that you were on anything other than wreckage. The roof and sides of the engineering station of the locomotive had long since deteriorated. As I swam along the length of the locomotive and over the huge iron spoked wheels now lying dormant, I couldn't help but wonder what their de-

stiny would have been in war-ravaged North Africa.

I located the second engine almost totally buried under debris, lying on its side next to the outside bulkhead of the aftermost hold. The only parts of this locomotive that could be seen were the small wheels in the front of the body. Now that I had finally found these giants, I was satisfied, and headed back.

Swimming over the tilted deck, I passed over literally acres of large truck differentials and tires which covered the bottom in no apparent pattern. In some places the tires were still stacked neatly together in racks, mounted on rims and perfectly intact. I saw complete engine blocks and transmission assemblies everywhere. The amount of cargo strewn around the *Arundo* seemed endless.

An aura of mystery surrounds a part of the *Arundo's* cargo. A shipment of valuable "instruments" was aboard which reportedly was worth more than the rest of the shipment combined. The actual contents of the valuable cargo is only conjecture, but this much is known: in November, 1945, a large scale salvage attempt was undertaken by the Diamond Salvage Company of Washington to raise the *Arundo* from her resting place on the bottom. There must have been good cause for such a major salvage attempt in those days, considering the depth of water involved and the magnitude of the task. The attempt was unsuccessful.

With my air supply running low, I headed for the bow. The foremost part of the bow was cathedral-like in appearance. It jutted upward at almost a 90 degree angle and was completely broken in two. Deteriorated Russian trawler nets hung ghostlike from the very peak of the bow, draping downward over hand rails and chocks that were still in place on the deck. The massive port side anchor was still in place, drawn up tight in its hawse pipe, and now served no useful purpose other than providing a backdrop for underwater photographers.

With my decompression meter considerably in the red, I removed my line from my tanks, tied it off on one of the *Arundo's* railings, and started for the surface. Slowly ascending through increasingly brighter, warmer layers of water, I reached 20 feet where I began my lengthy decompression. Multitudes of near-transparent, luminous jellyfish drifted slowly by as I hung on the softly swaying line. It was in this tranquil, silent setting of the near surface, so different from the cold, stark reality of the scene below, that I paused to reflect upon what I had just seen in the depths of the North Atlantic. For 30 minutes or more, I had gone back in time to a beautiful, sunny day in 1942, when death rode the wake of a speeding torpedo. >>>



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The Southern California Underwater Film Exposition will be held this November 2, 1974, at the Anaheim High School Auditorium, 811 W. Lincoln, Anaheim, California. The evening will be programmed to provide the audience with hours of total underwater entertainment that divers of all interests can enjoy, and films will feature everything from the nearby waters of California to the warm waters of the Bahamas.

One of the feature presentations of the evening will be the Orange County premier of a new film by Bob Hollis, president of Oceanic Products, telling the story of the attempted salvaging of the *Andrea Doria*, as shown in this year's January and February issues of SKIN DIVER. This is a fast moving, full length underwater film that divers will enjoy.



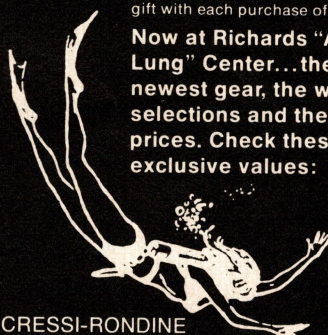
Film Expo host, Jack McKenney (right) with underwater photographer, Hans Hass.

Jack McKenney, editor of SKIN DIVER, will be master of ceremonies for the evening's performance and will present an early film made in Europe by world famous underwater photographer Hans Hass. Other exciting underwater footage from the top people in the field of underwater cinematography will be presented. Much of the footage will have its premier showing during the show, and will cover some of the most exciting underwater scenery in the world.

Another attraction of the exposition will be a number of exhibits from the leaders in the scuba field. This will give the diver a chance to look over the latest equipment in the field of diving and also ask questions of the people who make and sell the equipment. The exhibits will be set up throughout the lobby areas of the auditorium for everyone to enjoy.

The doors to the auditorium will open at 6 pm so that everyone may view the display area. The film exposition will start at 8 pm. Tickets for the show are \$3.50 and may be obtained in advance by sending a check to the Exposition c/o Richard A. Gill, 1825 Seadrift Drive, Corona del Mar, Calif. 92625.

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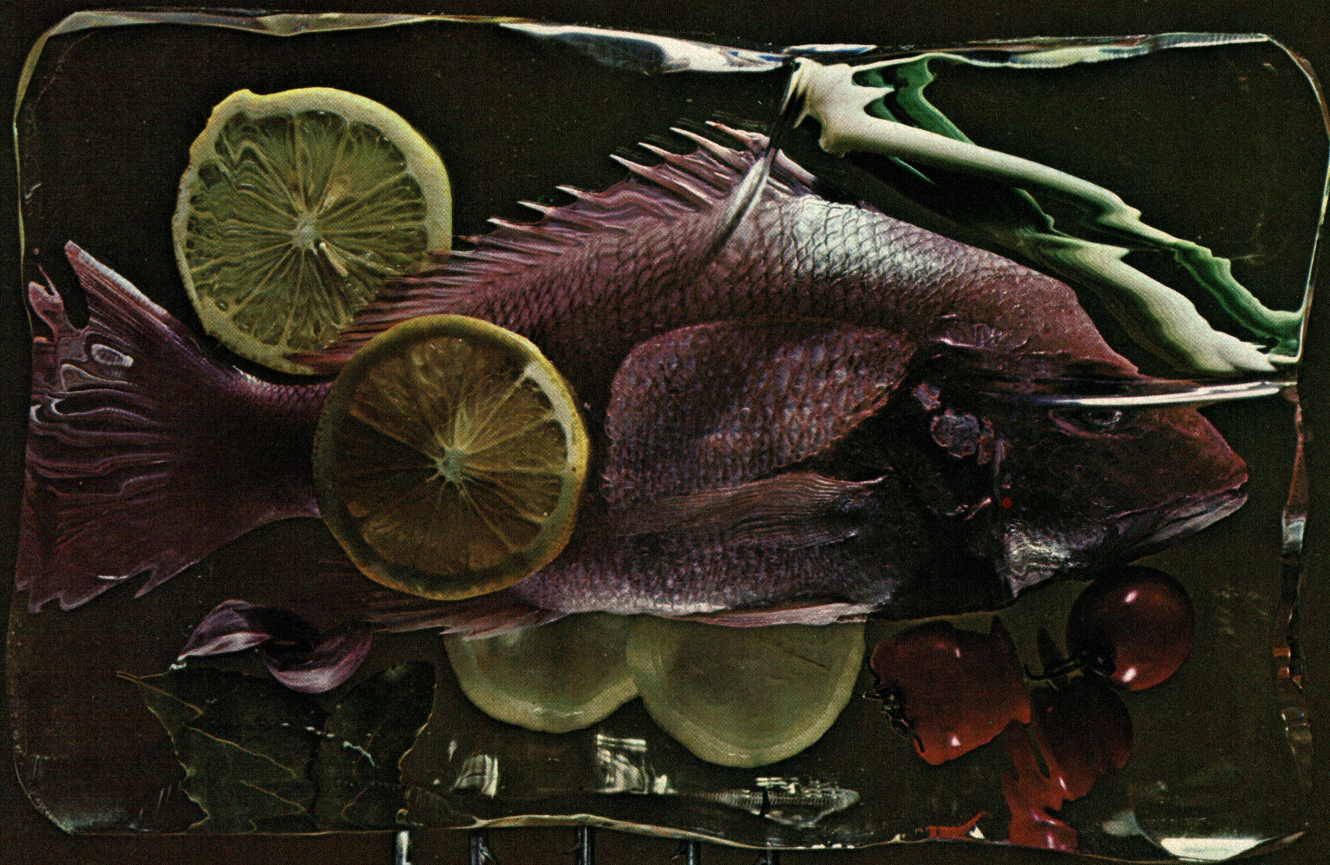
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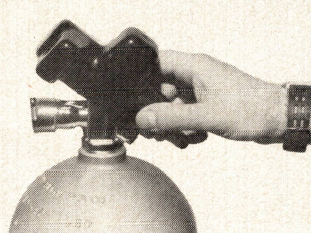
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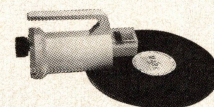
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A Special Breed of People

By Jan Riddle

A giant caldron of black liquid bubbles furiously. Forty-three young men surrounding the tank watch it intently. Suddenly, a creature slowly begins to emerge from the caldron, awkwardly climbing up a ladder. The "Thing" has human hands that seem like unnatural attachments to a fabric body with a round metal head and portholes for eyes. Then six more creatures follow the first. The silent spectators move closer. No one seems alarmed, nor shows surprise.

Is this a consortium of earth wizards and outer space creatures? The year 2001? On Mars? No. The strange-looking beings are as human as the young men now helping the creatures remove their helmets. The year is now, and the place is Oakland, California. This is the Coastal School of Deep Sea Diving. All of the creatures, and their "tenders," are working diver trainees. They are being directed by two instructors and A. A. Mikalow, the founder and managing director of this unique school.

The school is situated on a navigable river, off San Francisco Bay, and this unique waterfront location makes a full collection of barges and docks possible. *Coastal Researcher 1* is the 125 ton oceangoing vessel used to train students in diving techniques under simulated operating conditions. The school also has a 75 horsepower diving barge, a fully equipped two-man dry submarine for the submersible operator course, and several other boats and stationary docks. Students learn seamanship and rigging aboard the *Coastal Researcher 1*, in addition to deep diving, demolition, photography, general salvage, underwater welding and cutting, pipe inspection, blueprint reading, oil well structures and well heads theory.

Instructors can observe the diver trainee's work from the underwater observation tower. This structure looks like a steel silo with windows. The student works inside on equipment such as a "Christmas tree" used in oil fields, while the instructor watches him through the porthole. When the student finishes his project, the instructor gives him valuable feedback, often with the aid of a video tape recorder by which the student's progress can be reviewed.



Diver, wearing a Mark V suit, is lowered into the water from a diving platform off school's ocean going training vessel.

Students also learn to use the deep submergence chamber which employs the latest decompression techniques to take a man to the inner limits of hydrospace and bring him safely to the surface. Coastal has the free ascent chamber, used in the United States Navy to teach lock-in/lock-out diving. Inside these unique chambers the student works with a wide variety of tools, both hydraulic and pneumatic-driven, and the latest sonic testing method to inspect metal thickness and welds on underwater installations or ships, the Budd ultra-sonic tester.

A four-week advanced course teaches the more complicated mixed gas diving; and the submersible operator course qualifies the graduate for the wet pilot's certificate at the end of one week. For those who just want to learn pleasure diving, the scuba course is the answer. With the exception of the scuba course, students spend seven and one-half hours a day, five days a week learning their future trade. And the curriculum shows that it covers all phases of diving.

Coastal School has several decompression chambers to accommodate injured divers in the area and to use for training the students. They discover what the underwater pressure of diving feels like by undergoing simulated deep diving pressures in the tank, which is large enough to hold as many as 20 students at one time. This training will be the students' first experience with decompression tanks. Safety rules are so well taught and enforced that there has never been an accident in the 23 year history of Coastal Diving School.

At the end of the 11½ week basic course the student is able to go to work without serving a long apprenticeship period. He may go into the oil industry where increased offshore drilling has proportionately increased the demand

(Continued on Page 25)

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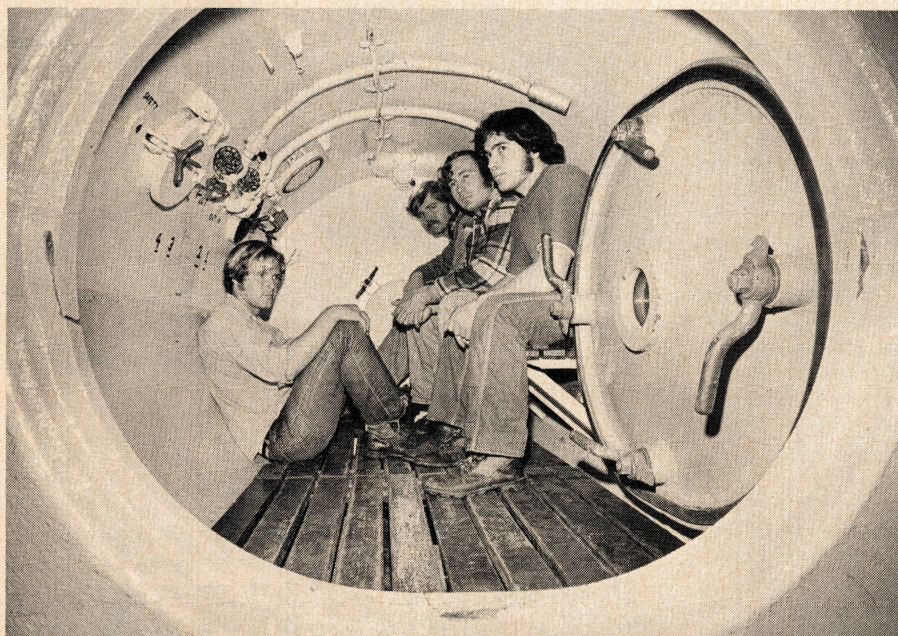
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A SPECIAL BREED OF PEOPLE

(Continued from Page 23)

for trained divers who can perform varied assignments as welding, repairing, and inspecting pipelines. The construction industry needs divers for building bridges, tunnels and dams. Salvage work is another job opportunity as divers are regularly needed to repair waterfront installations or to recover ships and barges. Divers are always needed for research, not only in marine biology, oceanography and ecology; but also in the field of archaeology where undersea exploration is contributing enormously to the knowledge of early civilizations. The basic course graduate is qualified in all these fields.

School founder Al Mikalow has had experience in every area of deep sea diving — geographic as well as vocation-wise. He still doesn't spend much of his time in an office. It's obvious that the reputation and size of Coastal Diving School was not built while the boss sat at a desk. Constantly touring, checking, telephoning, and talking to prospective students and their future employers, he's off now to take a look at the students diving for the first time in the zero-visibility training tank.



These students are getting ready to experience undersea pressures in Coastal's double lock decompression chamber.

Photograph by Jack Stewart

The diver who looked so nervous before he went down is back grinning. Did he enjoy that first dive? "Wow, what a trip!" is the answer.

Al shakes his head and smiles indulgently: "It's not just putting the suit on and going down. You have to work in water — cold, miserable, under adverse conditions all the time. You work against the elements of nature. That's what you get the money for! It's nothing more than hard labor underwater. One hour of div-

ing is equal to eight hours of labor on the surface. You're working under increased pressure and strain. You've got currents, mud, all kinds of problems. It takes a special breed of people to be divers."

And that's what Al looks for when a student applies to the school. He is emphatic when he says that he doesn't take everyone who sends in the application fee. He's looking for good workers with enough brains, and that all-important trait, tenacity. He interviews most prospective students, watching for those qualities. Another important virtue, patience, is tested every day of the course. The fact that 80 percent of Coastal's graduates are employed in diving today is proof of Al's success in selecting and training his students.

Physical endurance is another requisite. A person must be between the ages of 18 and 30 and undergo a thorough physical examination before he is accepted at Coastal. The students run at least a mile and do calisthenics every morning. As one student said, "If you're not in good shape when you come, you are when you get out!"

What kind of person would want to put up with the conditions and hard labor involved in being a successful diver? And why? Some of Coastal's students have

been divers before, perhaps in military service; some have had experience in scuba and snorkeling; some have never done any diving. The students don't come only for the money they will earn when they graduate, although the amount is impressive. Commercial diving isn't for every person — or even for the average person. It is for a special breed of people. And Coastal School of Deep Sea Diving is tailored to the measure of this individual. 

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By Jim and Cathy Church

The "Green Things" family of supplementary lenses expands the versatility of the Nikonos 35mm lens from ultra-wide to macro photography. At this writing, these lenses include: the FE-5 Fisheye Lens; Opal-Eye; Marine View 50; Close-up lenses +2, +3, +4 and +6; and Macro Lenses III and IV.

Each accessory lens fits over the Nikonos lens mount, is held in place by a preset nylon screw, and can be installed or removed while underwater. The exposure and focus controls can be adjusted or read with the accessories in place, the only exception being that the Fisheye lens must be removed to read the f-stop and distance. While the Fisheye lens can be used with either the 35mm or 28mm Nikonos lens, the other accessories are for the 35mm lens only. A 28mm lens causes rounded corners in the pictures.

FE-5 Fisheye — The FE-5 Fisheye lens, which sells for \$149.50, was designed exclusively for ultra-wide Nikonos photography. With the 35mm lens, the FE-5 has a picture angle of 150 degrees and yields a circular image area on the 35mm negative that is cropped at top and bottom, but with a few millimeters of clearance at the left and right sides. With the 28mm lens, the picture angle is 160 degrees and the circular image area appears uncropped in the center of the negative.

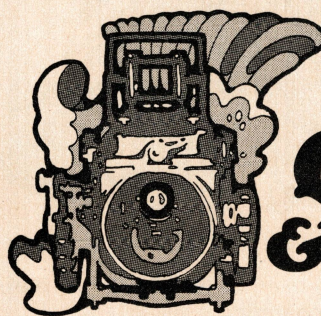
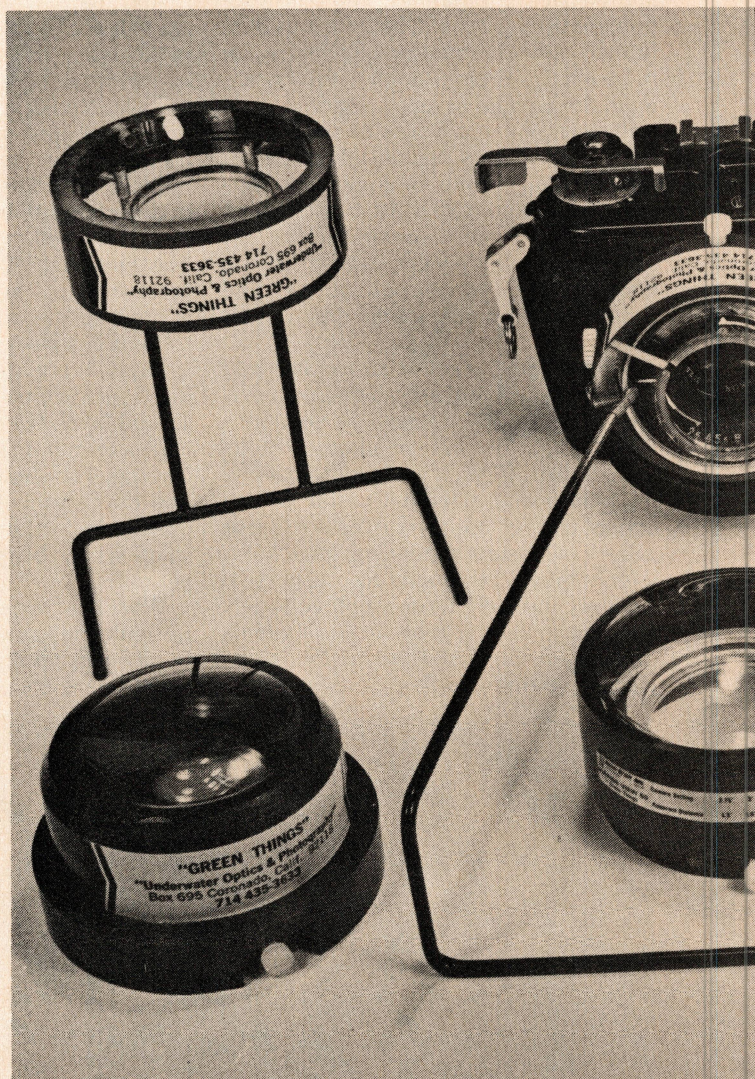
Depth of field is phenomenal. With a 35mm lens focused for 2.75 feet, depth of field extends from the dome port to about three feet at f22. This provides the potential for some interesting close-ups. With the lens set for seven feet, depth of field extends from about 18 apparent inches to infinity. When used with the 28mm lens, depth of field is even greater.

We suggest using the FE-5 as follows: (1) Slip the Fisheye lens off the camera and use it as a viewfinder to approximate the image that will be recorded on film. It's the next best thing to reflex viewing. (2) Take an exposure meter reading through the Fisheye lens while it is aimed at the subject. (3) Set the camera for exposure and focus and slip the Fisheye lens over the Nikonos lens mount. (4) Aim the camera and take the picture. This accessory proves its value in dirty water—we've taken full-body pictures of divers at less than two feet.

The Opal-Eye — The Opal-Eye, priced at \$149.50, is an optical widener which increases the picture angle of the 35mm lens to 105 degrees diagonally—slightly wider than the 92 degree picture angle of a Seacor 21mm lens and dome port. Its purpose is to allow pictures to be taken of large subjects at minimum camera-to-subject distances. A full-body picture of a diver, for example, can be taken from only three feet away. Photographs showing groups of divers can also be taken, photographs that might be impossible with the 35mm lens alone because of the camera-to-subject distances required.

We tested the Opal-Eye under harsh conditions—rough water with only two to three feet of visibility. Using two Nikonos cameras mounted on a double camera bracket—one with a 35mm lens and Opal-Eye, the other with our 21mm prime lens and dome port—we took several comparative pictures. Our conclusion is that the Opal-Eye is a valuable, low-cost wide-angle lens system for the sports photographer, but wouldn't match the optical quality of the 21mm lens for exacting, scientific work.

Marine View 50 — Priced at \$65, the Marine View 50 is an optical widener that compensates for the loss of picture angle caused by refraction at the flat port of the Nikonos lens. The U/W picture angle of the 35mm lens, when used with a Marine View 50, is 62 degrees diagonally—slightly more than the 59 degrees U/W picture angle of the 28mm lens. Depth of field, of course, increases with increased picture angle. The 35mm lens/Marine View combination can be set for focused appar-



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PRODUCT REPORT

Supplementary lens for Nikonos by "Green Things"



First row: Opal-Eye; Marine View 50; Close-up lenses +2, +3, +4, and +6. Second row: Macro Lens III; Macro Lens IV (on camera); FE-5 Fisheye Lens.



"GREEN THINGS" CLOSE-UP LENS SPECIFICATIONS IN MEASURED INCHES

Interpolated by authors from apparent distance measurements published by "Green Things." All measurements to nearest 1/4 inch.

Close-up lens used	Focus setting	Focused distance	Picture area	Depth of field at f22
+2 diopter	2.75 feet Infinity	16 26	8 x 12 12 1/2 x 18 1/2	14 to 20 20 1/4 to 37 1/2
+3 diopter	2.75 feet Infinity	12 17 1/4	5 1/2 x 8 1/2 8 1/4 x 12 1/2	11 to 14 1/2 14 1/2 to 22
+4 diopter	2.75 feet Infinity	10 3/4 13 3/4	4 1/2 x 7 6 x 9	9 to 11 1/2 11 1/2 to 15 1/2
+6 diopter	2.75 feet Infinity	6 3/4 8 1/2	3 3/4 x 5 3/4 n.a.	6 1/2 to 8 1/4 7 3/4 to 10
Macro Lens IV	2.75 Infinity	at framer past framer	3 3/4 x 5 3/4 n.a.	6 1/2 to 8 1/4 7 3/4 to 10
Macro Lens III	2.75 Infinity	at framer past framer	2 1/2 x 3 1/2 n.a.	3 3/4 to 4 3/4 4 to 5

All focused distances measured from front of lens to subject. n.a. = not available

ent underwater distances ranging from 16 inches to 12 feet.

Although not as wide-angle as the Opal-Eye, the Marine View 50 does allow moderately wide-angle U/W photography at a moderate price. While we personally prefer the Opal-Eye, the Marine View is a useful wide-angle accessory.

Close-Up Lenses — The four close-up lenses, called +2, +3, +4 and +6, are designated in diopters and are priced at \$26 each. The higher the number (diopter) the greater the magnification and the closer the focused distance. Each lens bears a label showing the apparent focused distances for camera setting of 2.75 feet and infinity.

Aiming the camera with close-up lenses may be difficult at first because both the optical viewfinder built into the Nikonos and the clip-on sportsfinders do not function at such close distances. Many U/W photographers have learned to aim by "feel" and estimate distance and picture area by eye. Actually, it is largely a matter of practice.

To maintain depth of field, f22 is recommended. And, because a flash unit will be needed for most exposures at f22, the correct flash-to-subject distance must be determined. We suggest taking a series of test exposures with the flash held at one-half, one, one and one-half and two feet from the subject. One of these distances should provide a pleasing exposure which can be used as a guide for subsequent exposures.

Macro Lenses — Macro Lenses III and IV (also called: "Untension Tubes III and IV") retail for \$39.50 and \$34.50 respectively and have focal frames for accurate aiming.

Macro Lens III has an image/subject ratio of 1:2.75—the actual life-size of the subject is only 2.75 times larger than the subject's image on film. (Note: some manufacturers reverse this expression and would call this a subject/image ratio of 2.75:1.) At f22, with the focus set for 2.75 feet, depth of field is about one inch and extends from slightly in front to slightly past the framer. With the focus set for infinity, it extends from the framer outward.

Macro Lens IV has the same close-up diopter as close-up lens +6, with an image/subject ratio of 1:4. The major difference between the two is that the Macro Lens IV has a focal frame. Depth of field, which is about one and three-fourths inches, also extends from in front to behind the frame with a setting of 2.75 feet and from the frame outward at infinity.

Both Macro Lenses cover a picture area close to that of a 3:1 (subject/image ratio) extension tube, but do not increase the effective f-number. (Note: because of a bellows factor which occurs when the Nikonos lens is moved forward by an extension tube, the actual f-number is greater than indicated by the camera setting.) Therefore, less intense lighting, or a lower ASA rating, may sometimes be used.

Using "Green Things" Accessories — When using any of the accessories discussed, follow these rules for best results: (1) Don't try to take every accessory into the water at once. Concentrate on one or possibly two. (2) Remove any air bubbles trapped between the accessory and the Nikonos lens port. (3) Before taking pictures, press the accessory firmly against the Nikonos lens mount to insure correct alignment. (4) Use the hole drilled in each accessory to attach it to the camera with a short cord, or hold the camera so you can feel the accessory when swimming. (5) Do not rotate the accessory when removing it underwater; it could twist the Nikonos lens off and cause a flood. (6) Use a cloth and abrasive toothpaste to remove or smooth scratches in dome or flat ports.

The "Green Things" lens accessories discussed in this article are distributed through dive shops by Aqua-Craft, 3280 Kurtz Street, San Diego, California 92110.

SHARK RESEARCH FACT OR FICTION?

By Bill Barada

With a 15 pound bull lobster clutched firmly by the horns I flipped upward in the clear, blue water, threading my way through a tangle of kelp toward the surface. A few moments later the bug was tucked safely into a bulging goody bag. After two hours of free diving the bag was full and I had time to relax.

Startled, I spotted a triangular fin cutting slowly across the surface less than 50 feet away. As I watched, a second shark fin appeared, cruising in the opposite direction. I began swimming slowly toward shore, but stopped in dismay when I saw more shark fins slicing the surface between me and the beach. Thoroughly frightened, I looked around and saw that I was completely surrounded by circling sharks. I counted 19 fins on the surface and imagined many more swimming out of sight underwater. Some of the fins moved closer and the circle tightened.

Fighting against panic, I tried to decide what could be done. I was all alone, about 200 yards offshore from desolate Santa Cruz Island, California. The nearest civilization was on the mainland about 40 miles away, and the fishing boat that had dropped me off was not due to return for another hour. My only weapon was a six foot frog-gig which made me feel about as secure as an elephant hunter with a BB gun. I have never felt more completely alone and abandoned in my life.

I had two choices: swim for shore, or stay where I was and wait for the boat. Even if I reached the beach, I would have to swim back through the sharks when the boat returned. It seemed safer above the shallow, submerged reef. The rocks and kelp 10 feet beneath the surface afforded some protection from deep water attack.

The next hour was like a never-ending nightmare that got worse with each passing minute. I began watching for sharks underwater, twisting and turning in an effort to peer in all directions at once. Each time I raised my head the circle of shark fins had moved closer.

Then I began to see the torpedo-shaped bodies underwater. They drifted across the reef two and three at a time, often only 10 or 15 feet away. I spotted one slinking through the kelp beneath my flippers. From then on, I imagined sharks lurking in every moving shadow and undulating clump of seaweed.

The tension almost reached a breaking point when the sharks began making passes. They came in from all angles, slowly and deliberately, giving me a close look at sudden death as their graceful bodies cruised within a few feet

before they swerved away. I glimpsed one coming straight in at me from behind. It veered when I turned in its direction. Another suddenly appeared from behind the reef, moving fast. And I spotted more slinking among the rocks and kelp as if trying to sneak close without being seen. A hopeless feeling began to overwhelm me. The constant tension drained my strength. I remember thinking, "It will soon be over. One of them will strike. My friends on the boat will find the float with the sack of bugs and think I drowned." I resented the idea that nobody would ever know what really happened.

Then the boat appeared around a point and its white hull and swirling wake looked as beautiful to me as an angel from heaven. They picked me up and, once safely aboard, the harrowing experience was immediately relegated to memory as "just another shark story."

That was back in 1947. Diving alone was a common practice because buddies were hard to find and modern safety rules were still being learned, the hard way, from experience. The sharks were Pacific blues which have a nasty reputation of attacking victims of shipwrecks.

At the time I was absolutely convinced that I had come within a hair's breadth of being eaten alive. Now, however, almost 30 years and thousands of shark encounters later, I am not at all sure I was in any real danger. Since then I have learned that divers can swim amid sharks unharmed and, in spite of a wealth of scientific knowledge and a mass of experience accumulated over the years, we still know very little about shark behavior. We know that some sharks do bite both swimmers and divers. But the question of which shark will bite, when it will bite and why it will bite is still as much a matter of opinion as it was 20 years ago.

For those who believe that scientific research and statistical analysis will provide the answers, the latest word on the subject is *Shark Attack Against Man*, a computerized evaluation of 1165 actual case histories of shark attacks over a period of more than ten years. Shipwrecks and other disasters at sea are not included; only attacks on swimmers, divers, fishermen, and people involved in similar activities. The report was prepared by Dr. H. David Baldrige of the Smithsonian Shark Research Panel, and it refutes many of the most cherished convictions of skin divers regarding shark behavior. For example, Dr. Baldrige states, "Contrary to current ideas, divers appear attack prone, with a strong relationship to spear-fishing. Trends indicate that, in the 1970s, attacks upon divers will average at least one-third of all reported cases."

However, Dr. Baldrige admits his conclusions are based upon "common sense" rather than scientific data. Another computer expert, William Borucki of the NASA Research Center, gave up trying to evaluate the information and called the Shark Attack File "data noise." The problem is that *Shark Attack Against Man* contains conclusions based only on conditions when attacks occurred and has no data whatsoever about encounters in which attacks did not occur. Dr. Baldrige says, "This is only half the picture of shark attack causative factors, and no equation has ever been solved by considering only the parameters on one side of the equal sign."

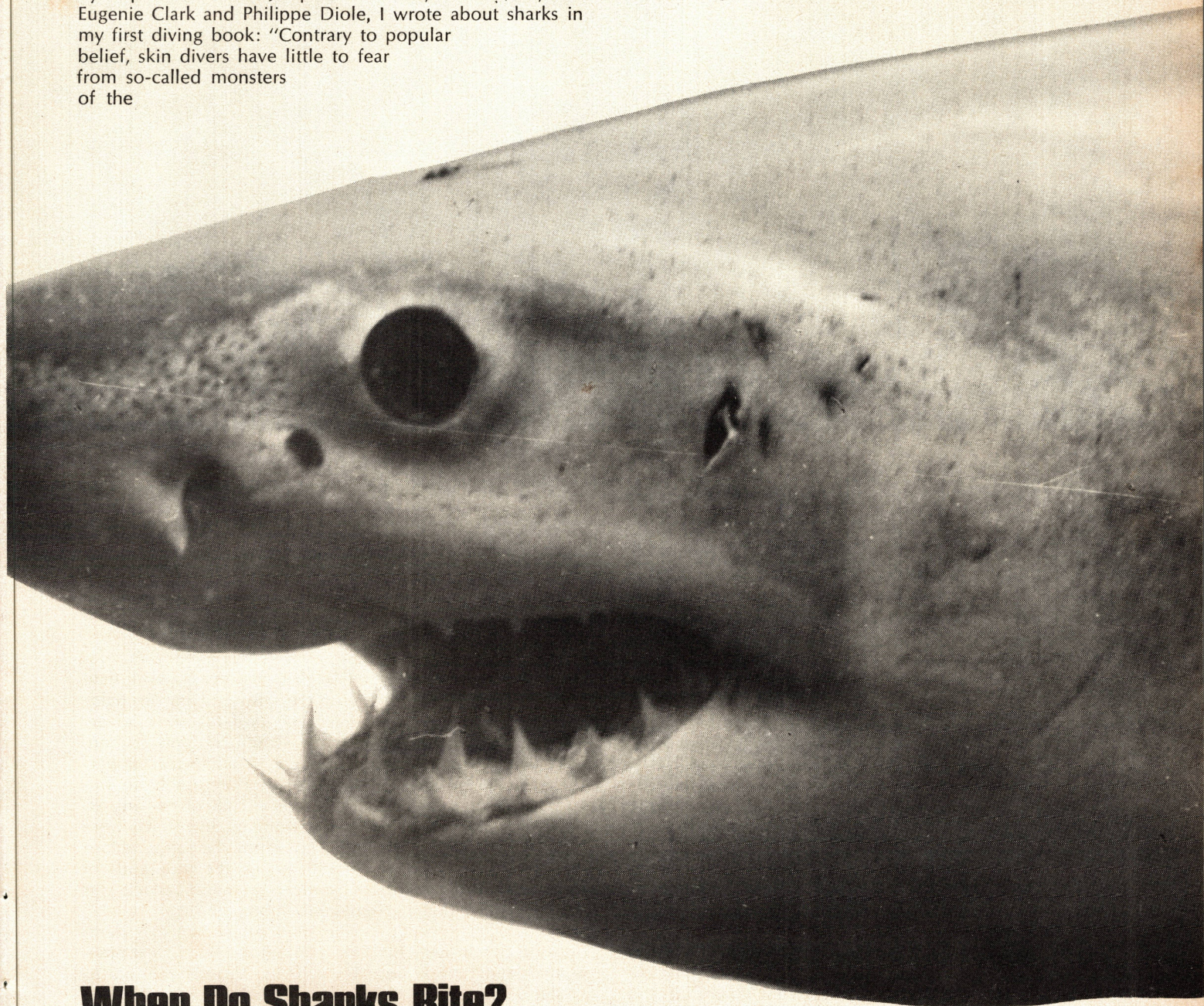
I believe skin divers can provide much of the information needed to balance this equation. Divers have been

asking — and answering — questions about sharks since the goggle-fishing days of the early 1930s. Collectively we have more observations of shark encounters under actual field conditions than any group in the world. We also probably have a more personal interest in shark behavior than any other group. Thus, conclusions based upon the collective observations of skin divers should contain as much "common sense" as those of Dr. Baldrige.

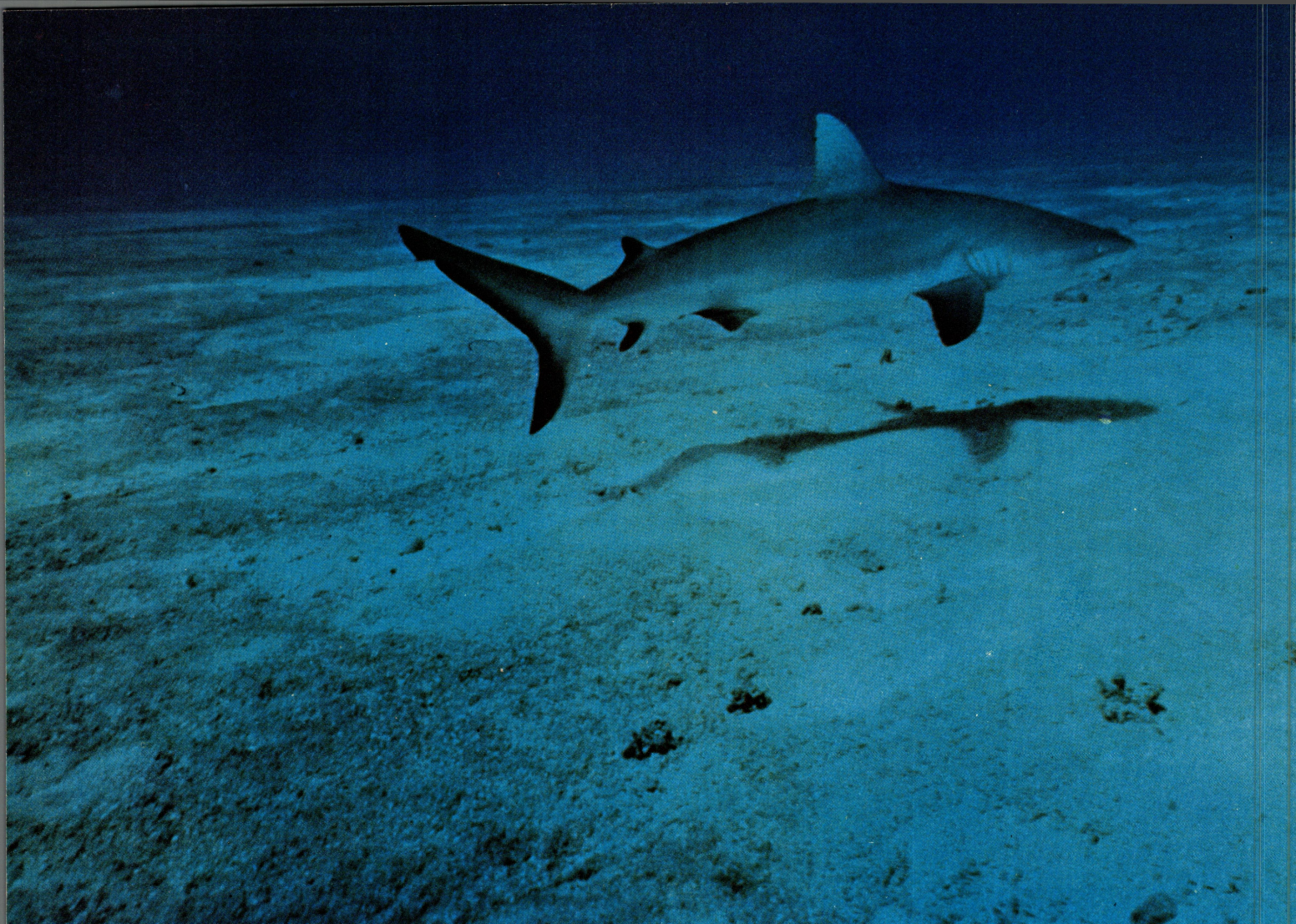
I began collecting shark information from divers back in the 1940s. By 1955, after 20 years of personal experience and armed with information gleaned from diving books by experts such as Jacques Cousteau, Hans Hass, Dr. Eugenie Clark and Philippe Diolè, I wrote about sharks in my first diving book: "Contrary to popular belief, skin divers have little to fear from so-called monsters of the

deep. Swapping stories with divers across the world has convinced me that the ferocity attributed to these denizens is greatly overrated. However, *one never knows what they are going to do.*"

Today, with millions of divers exploring the oceans from the arctic to the tropics, we have managed to debunk most of the ancient myths about sharks. But, we have also created a few new ones of our own. Examining some of these popular conceptions and comparing them with the conclusions Dr. Baldrige reached from his statistics should prove interesting, and perhaps enlightening.



When Do Sharks Bite? Do They Have a Pattern?



Are divers attack prone? — Dr. Baldrige's statement that divers are "attack prone" is based on the fact that approximately 20 percent of the total number of attack victims were divers, plus the assumption that divers surely did not constitute one-fifth of the total number of people exposed to attack. However, all types of "divers" are lumped together as a group — snorkelers, pearl and shell divers, commercial divers, spearfishermen and scuba divers. Then he implies that this evidence refutes the "generally accepted viewpoint, held especially by divers themselves, that totally submerged persons are less susceptible to shark attack than swimmers at the surface."

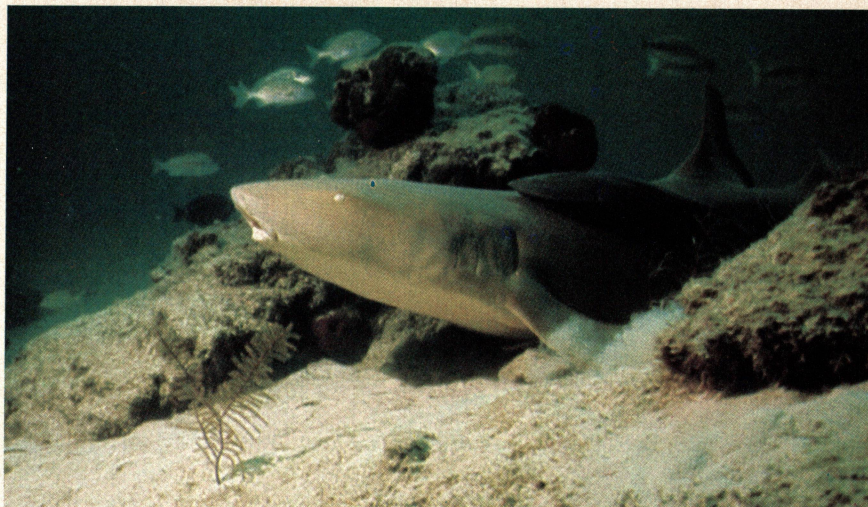
First, 20 percent of ocean swimmers may very well use a mask and flippers, and thus be classified as "divers." Also, 31 percent of the diver-victims were either on the surface or within five feet of the surface. And anybody who has watched a novice snorkeler splashing the surface will admit that a shark would have a difficult time trying to decide if the turbulence was caused by a diver or a swimmer. The concept that divers are less subject to attack is based upon the experience of skilled underwater men who avoid surface disturbance.

Statistics show that most attacks occur near popular beaches, in warmer water, during clear weather, and that 62 percent of all attacks are in water less than five feet deep. The number of attacks drops off sharply in deeper water, but Dr. Baldrige maintains that this does not mean attacks are more likely in shallow water, just that there are

more people available to marauding sharks. He concludes that attacks are actually more likely a long distance from shore because he believes there are less swimmers, thus the percentage of offshore attacks to the number of available people is higher. He also maintains there is no such thing as "shark infested waters" because attacks occur in all ocean waters in direct proportion to the number of people available.

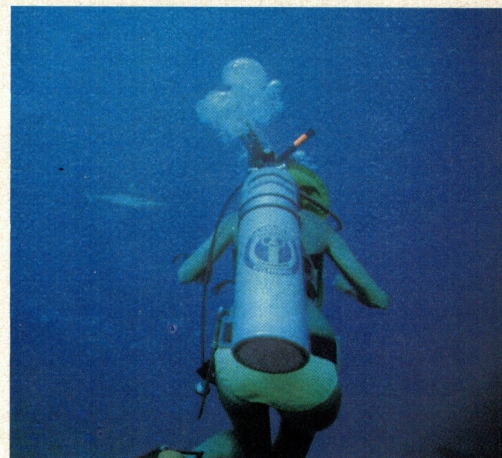
This is logical, and it verifies divers' experience that far more sharks are encountered in deeper water offshore than in shallow lagoons, and close-in reefs. By applying Dr. Baldrige's reasoning to skin divers we find that first, divers work farther offshore than most swimmers, and second, wet suits permit diving year round, in all water temperatures, in bad weather, and in isolated areas seldom frequented by bathers. Thus, it is logical that divers are exposed to far more sharks than swimmers and if we were truly "attack prone" we would not enjoy the safety record we have today. This is substantiated by the thousands of shark encounters reported by divers in which attack was apparently avoided by remaining submerged.

The man-eater myth — The shark attack statistics demonstrate conclusively that the term "man-eater" is extremely misleading and is probably a myth. About three-fourths of the victims survived the attacks and the nature of the wounds received were not at all consistent with determined efforts by "the sea's most efficient killer" to devour its human victim. In only six cases out of more than 1500



photographs by Paul Tzimoulis

There are over 250 species of sharks in the world, each with its own distinctive characteristics and temperament. Shark researchers have been trying to find a common denominator in their habits that would make shark behavior predictable but so far they haven't found anything they would be willing to bet on.



photograph by Jack McKenney

attacks was it reported that the victims were thought to have been swallowed whole. An overwhelming number of wounds appeared to be of a slashing or raking nature rather than a bite, as if the shark were fighting rather than trying to obtain a meal. In most cases the victim would have survived if prompt treatment had been given.

Diving at a shark to scare it away — This is a tactic widely advocated by divers. Dr. Baldrige suggests that attacks on humans may be due to territorial protection or similar reactions in which the shark considers the human a threat or a challenge. In this case diving at a shark could actually trigger an attack.

This is supported by Dr. Walter Starck's research with gray sharks in the South Pacific. Dr. Starck finds that when gray sharks are pressed by a small, wet submarine about 40 percent will suddenly turn and dramatically attack the sub. His findings demonstrate that some of our convictions about shark behavior can prove to be dangerous. Al Giddings, Dewey Bergman and I spent four days diving and spearing fish amid hundreds of frenzied gray sharks at Rangiroa. (SDM, April '72) We often chased them in order to get close shots with cameras. Giddings joined Dr. Starck near Truk Lagoon and his experience tells what would have happened had we pressed the sharks too hard.

Giddings explained, "We were cruising the walls of the pass looking for sharks at a depth of about 100 feet. The Perry Shark Hunter is a 14 foot long wet sub that can do about three knots. Walter was in front handling the con-

trols. I was in the rear. When we found sharks the plan called for me to swim outside and film long shots of sharks attacking the sub. The water was crystal clear with visibility at least 250 feet. The wall of the pass looked beautiful. It was like drifting Fifth Avenue half way up the side of the buildings. Not a shark was in sight anywhere.

"Suddenly we heard a terrific report within the submarine. It sounded like a muffled explosion, or something slamming down hard on the hood of a car. Walter looked at me, then began checking instruments to see if they indicated trouble. I checked the camera gear, suspecting an implosion. Nothing! Not a sign of anything wrong.

"Then, wham! A second report vibrated through the sub. Walter turned again. I made a questioning signal, 'what's happening?' He spread his arms and shook his head. 'I don't know!' I thought the sub was breaking up. Something was tearing it to pieces.

"Then I saw it. A large gray shark raced from beneath us, rocketed out in front of the sub, and went into the classic, rhythmic attack pattern. The shark made a series of snake-like, twisting S-turns as its mouth worked spasmodically. Then it turned, hurling itself at the sub like a living torpedo, executing a 180 degree turn at 30 knots. It seemed aimed at my head. I dodged, and heard the impact as it hit just behind my right shoulder.

"I stayed as far away from that part of the tiny compartment would permit. Walter grabbed the side curtains and pulled them closed, then turned and began pointing excit-



photograph by Author

edly at something behind me. I was afraid to look, sure I would see the shark coming at us again. Finally I turned, and was staggered by what I saw. A big chunk of canopy was missing. The shark had hit with such force it had knocked a basketball-sized hole in the half-inch plexiglass. And the hole was only six inches behind my shoulder."

Giddings says the sub experiments have demonstrated that a high percentage of gray sharks turn and attack if they are pressed. When pursued to within about 12 to 15 feet they go into the erratic, pendulum-swinging attack posture. If pressed further, to some critical distance, they make a lightning-fast 180 degree turn and strike. Dr. Starck believes it is a result of territorial pressure. Giddings is convinced that the shark considers the sub a "big invader." He also believes the shark is attracted by movement of the men inside, and is actually directing the attack at that movement. At any rate, Giddings is now convinced that if you press a gray too hard under the right circumstances for about 15 or 20 seconds, or box them in, you are asking for an attack. The odds indicate a high-speed strike about three out of every five times you try it. He says that, in Rangiroa, we were within seconds of serious attack when we let the current carry us into the sharks.

Blood does not attract sharks — Dr. Baldrige states, "... Observations in the laboratory and those made in association with shark attacks largely do not support the generally accepted belief that, as was stated in a recent U.S. Air Force training film on survival at sea, a 'single molecule' of human blood will drive a shark into a frenzy."

Similar statements regarding the effect of human and animal blood on sharks can be found in navy manuals, scientific treatises, and throughout the literature of the sea. For years many scientists maintained that the smell of blood attracted sharks for long distances as if by magic and that sounds were of minor importance in this phenomenon. Divers have since demonstrated that sounds, especially those simulating the drumming of a wounded fish, are far more effective as shark attractants than either blood or bait.

Reports of shark encounters by divers who were bleeding from fresh wounds indicated that the blood had little or no effect on the sharks. Yet diving literature abounds with warnings to "never dive when bleeding from a cut or scratch, no matter how small," and to "leave the water immediately if wounded and bleeding." The shark attack statistics show that the danger from human blood is a myth.

Only 19 victims were bleeding prior to attack. In no cases did profuse bleeding from massive wounds in an attack excite a second shark to strike although they were often in the vicinity. The majority of attacks were only a single strike. Blood in the water did not trigger a second strike, and rescuers swimming into the bloody water were virtually immune from attack. Also, tests with bleeding ro-

dents in shark pens did not excite the sharks. Fish juices and stomach juices from rodents did trigger a reaction.

Many divers suffer bleeding wounds while swimming and few permit such injuries to drive them from the water. Yet, I have no reports from divers that blood from wounds caused any reaction on sharks they encountered. Giddings, Bergman and I were all bleeding from coral cuts while diving amid sharks in a feeding frenzy at Rangiroa, and this blood apparently had no effect whatsoever on the sharks.

Do sharks usually circle or make passes before striking? — In *The Shark*, by Jacques-Yves and Philippe Cousteau, published in 1970, they state, "Sharks never 'attack' a diver below the surface immediately. For a time that may be more or less long, but is generally considerable, they will circle around you, go away, and then cautiously return. You will have time enough to decide, calmly, whether to remain or to return to the surface."

The statistics of actual attacks indicate otherwise. In 108 cases of attacks on divers where data were available, 43 percent of the sharks were not seen at all prior to the encounter. In attacks on submerged divers, 41 percent of the sharks were not seen before they struck. The shark was most generally seen making a direct approach to the diver-victim and in 63 percent of the cases of submerged divers, the attack was sudden, violent and without warning.

However, skin divers' observations may be more reliable than reports of attacks received by the Shark Research Panel. For example, we have no information as to how observant the victims were prior to the attack. We have all, at one time or another, been preoccupied with underwater activities and suddenly found ourselves confronted by a shark. Who can say if they were circling or stalking us before they were seen? Also, we have abundant evidence that the large majority of sharks usually circle or make a few passes before coming at you, and, if you see them in time, you can usually ward off the attack by taking defensive action, or by leaving the water.

Conclusion — Between 1950 and 1959 there were only 63 reported cases of attacks upon divers of all types. Between 1960 and 1969 only 116 attacks were reported on divers. This is only about 10 percent per year and includes splash-around snorkelers as well as skilled and experienced divers. The majority of those were not fatal. Almost three-fourths survived. This is an amazing safety record. More snow skiers were wiped out on a single weekend than the total number of divers injured by sharks in the past ten years. It is especially reassuring when you consider that a number of divers hunt sharks for sport.

It is comforting to learn that in spite of the tremendous increase in the popularity of scuba during the last 15 years, the Shark Attack File contains reports of only 20 scuba divers as victims, out of a total of 189 diver-victims where data were available. The others were: free divers—106, pearl and shell divers—35, hard hat divers—7. For those who boast about spearing fish right under a shark's nose, 80 percent of the free diver victims were spearfishing and 51 percent still had captive fish in their possession when they were hit by an attack.

As I stated at the beginning of this piece, nobody has yet figured out the answer to the question, "When and why do sharks bite?" The statistics in the shark attack file only tend to confirm the conclusions we reached in 1955, almost 20 years ago, when I wrote, "Skin divers have little to fear from these so-called monsters of the deep. But, sharks have not survived for millions of years by being dumb or cowardly. The only thing we know for certain is that sharks are completely unpredictable." ■

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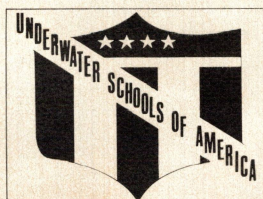
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SCALLI NAT'L SALES MGR.

Frank Scalli has been named national sales manager of the Aqua Lung division of U.S. Divers Co., according to John Cronin, president, and Gordon McClymont, V.P. marketing, for U.S. Divers. Scalli's position with U.S. Divers Co. blends well with his activities as a diver, instructor and organizer of diving related programs around the country.

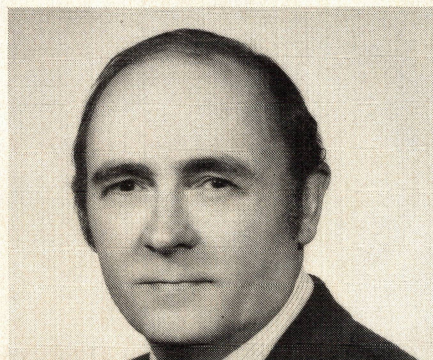
Scalli has been active in the diving industry for more than 20 years. He was



the first certified instructor in the New England area, and holds YMCA, NAUI and PADI instructor certification. He has served as the national chairman for the YMCA Skin and Scuba Diving Program, and as a member of the board of directors for both NAUI and PADI. Scalli joined U.S. Divers Co. in 1961 as eastern promotional director, became north eastern salesman in 1963, and was promoted to eastern sales manager in 1972.

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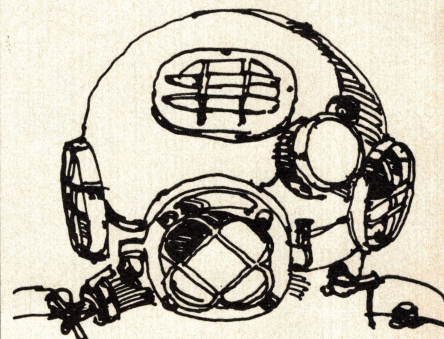
William N. Kirshner has been named executive secretary of the Underwater Society of America according to Michael Wagner, president of the Society. Kirshner, a Glenview, Illinois resident, is



president of Dynamic Marketing Programs, Inc., whose Professional Management Services Division administers the affairs of the Society in management, advertising and public relations.

The Underwater Society of America has, since its formation in 1960, fostered programs in the areas of standards and safety in diving, preservation of underwater ecology, coordination of advanced underwater educational and research projects, continuing research in diving medicine, the discovery and preservation of sunken historical artifacts, and underwater sports competition.

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Feathered Plumes of a Tube Worm

COLOR IT PURPLE

By Paul J. Tzimoulis

Looking for a new challenge? If you've run out of things to photograph underwater and are searching for new angles, try color.

The next time you dive your favorite reef, take a careful look around and determine which color seems most predominant. Then try to photograph as many creatures and formations on that reef which match your selected color. You may end up seeing your reef from a whole new perspective. Try your hand at the art of "reef coloring."

The photos on these two pages were all taken at Current Cut, Eleuthera, Bahamas. Purple seemed to be the most striking of predominant colors.

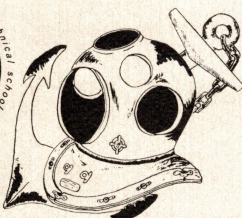
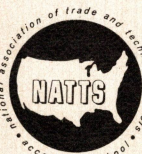
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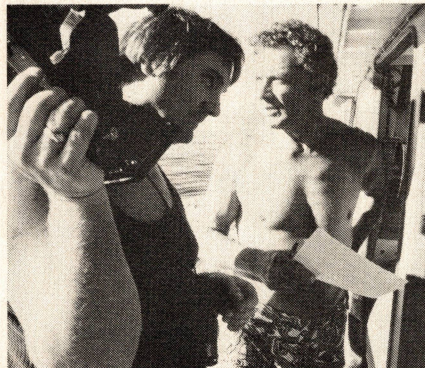
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CORNEL WILDE AT IQ6

Screen actor Cornel Wilde, starring in the soon to be released full length motion picture *The Treasure*, will be on hand at the Sixth International Conference on Underwater Education. A special showing of a behind the scenes look at the underwater film show will be held during IQ6 on Saturday, October 5.



photograph by Jack McKenney

Cameraman Al Giddings working with Cornel Wilde during filming of *Treasure*.

Underwater portions of *The Treasure*, containing some exciting high voltage shark action, were filmed by Al Giddings (Sea Films), assisted by Jack McKenney (SKIN DIVER) and Chuck Nicklin (Diving Locker). Clint Degn (Photo Marine) filmed the shooting of *The Treasure* and his film will give a great view of what really happens during the making of a major motion picture.

Stan Waterman will act as master of ceremonies for the show and will present his own film *Chambers of the Sea* in its West Coast premier. Filmed off the Cocos Keeling Islands, *Chambers of the Sea* features eye-popping shark feeding, sea snakes and other goodies.

The underwater film show is but one feature of the conference set at the Town and Country Hotel and Convention Center for October 4, 5 and 6, 1974 in San Diego, California. For information contact NAUI Headquarters, 22809 Barton Road, Colton, California 92324 (telephone 714/783-1862), or register at the conference center for either the whole conference or one day only.

NEW YMCA CARDS

Ken A. Brock, director of the National YMCA Scuba Program, has announced that two new red, white, blue and gold certification cards have been placed into service. One card is for the YMCA certified scuba instructor, and the other card is for the YMCA certified scuba diver. The YMCA Scuba Program has also placed new foil certificates into service.

Brock also announced that former nationally certified YMCA scuba instructors who are not actively teaching at the present time may contact YMCA Scuba Headquarters, 1611 Candler Bldg., Atlanta, Georgia 30303, for new information concerning the current inactive instructor's program.

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DO DIVERS USE MORE AIR IN COLD WATER?

It has been generally felt that a diver uses more of his breathing air while operating in cold water, but there is no evidence from currently available information to determine the rate of increased consumption. However, there soon may be, as a result of tests being conducted at the Naval Coastal Systems Laboratory in Panama City, Florida. In a project under NSAP (Navy Science Assistance Program) sponsorship, engineer Max Lippitt of NCSL's diving and salvage department is conducting gas consumption tests with six military divers as subjects at the Laboratory's hydrospace facility.

Following a preliminary physical examination, the divers, working as two-man teams, are properly suited with the operational wet suit they would normally be wearing during an underwater mission, and carry strapped to the body an electronic package that sends back to the monitors readings on heart function, respiration, and body temperature.

The divers, submerged in an 8 by 12 foot tank of water, undergo a series of tests while exposed to water temperatures of 40, 60, and 80 degrees Fahrenheit. They follow a planned schedule of rest, light and moderate work loads. Divers perform



During de-warming process, NCSL Panama City diver, Ron Ross, tries to smile through puffed lips after a dip in 40° water.

swimming tasks on a specially designed "swim ergometer," while continuous gas consumption and the physiological parameters are measured and recorded by equipment assembled and tested at NCSL.

The six divers have been doing their "thing" in water for test periods of six hours each in the 8 foot deep test tank at the

hydrospace facility. The bone-chilling effect of full submergence in nearly freezing water for prolonged periods with only the minimal protection of a wet suit must be experienced to comprehend fully the spirit and stamina exhibited by the divers participating in these tests. Adequate and reliable data could not be obtained without the outstanding performance and all-out effort shown by these men, according to Lippitt.

Although it is too early for any final conclusions, preliminary results show evidence that the diver does indeed consume more air while operating in cold water.

The project has been receiving valuable support from Captain George F. Bond, the Laboratory's special assistant for diving medicine. Also assisting as test conductor are Senior Chief Hospital Corpsman Harold Sartin of the medical staff, personnel of the hydrospace facility under G. W. Noble, and personnel of the diving locker. Participating as diver-subjects are Machinist Mate First Class Ken Robinson, Engineman First Class Cliff Cole, Boatswain's Mate Second Ron Ross, Operations Specialist Second Gordon McCormack, Radioman Second Ron Findlay, and Photographer Third Terry Davis.

Official U.S. Navy Photograph

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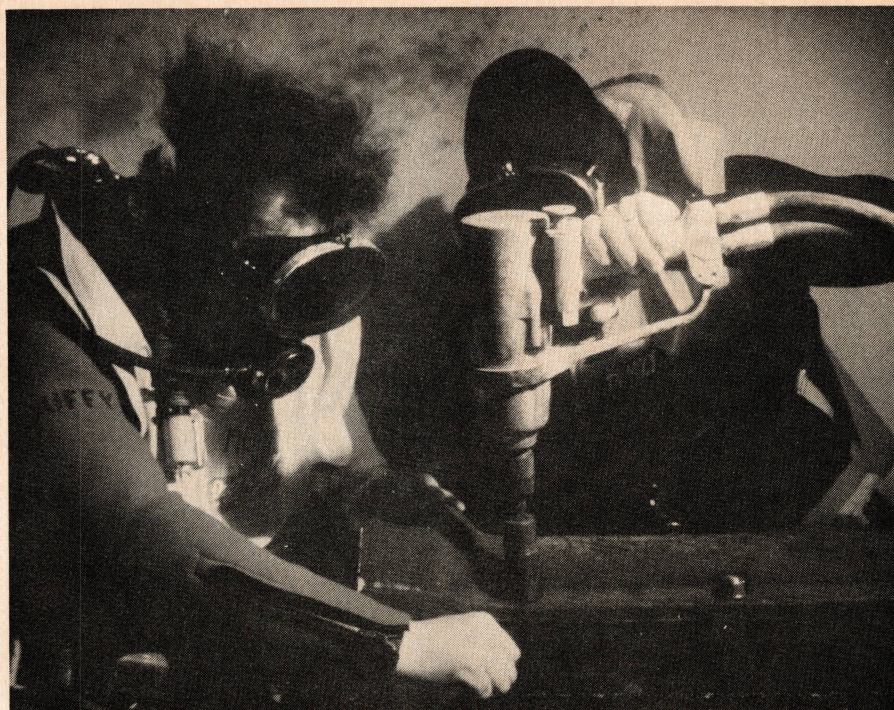
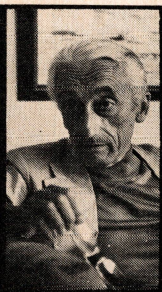
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TOOLS for the u/w worker

By John T Quirk

Engineers Ron Brackett and Ensign Tony Parisi of the Naval Civil Engineering Laboratory at Port Hueneme, Calif. (NCEL), plunged into the Laboratory's outdoor test tank and swam down to the 750 pound granite boulder that rested on the bottom. With a surface powered hydraulic rock drill, Brackett bored a three-quarter inch hole in the rock and inserted an expandable rock bolt, to which he fastened an eye nut. Then, after attaching a zippered lift device to the eye nut, the two men inflated the device, using a spare scuba bottle. Soon the lift device was sufficiently buoyant to raise the heavy rock, which the divers easily maneuvered across the tank.

The entire operation took slightly less than 5 minutes to complete. It is typical of the work being done at NCEL to develop, test and evaluate underwater tools and power systems for Navy operations. In this case, the task not only demonstrated the effectiveness of the rock drill but it also substantiated the concept of the variable buoyancy zippered lift device as a simple yet efficient means of lifting heavy objects in the sea.

In the NAVSHIPS program at NCEL, commercially available hydraulic pumps, rigging, load handling and mechanical cutting equipment are being evaluated to improve the navy's underwater salvage capability. The program is based on in-depth studies made to determine the areas most worthy of development. It has a dual objective; first, to provide the navy with diver operated hydraulic tools, and second, to develop hydraulic salvage equipment for opera-

tion with submersibles.

To get the hardware oriented part of the program underway, the NCEL project people, with the aid of experienced NAVSHIPS salvors, defined the most important underwater work functions which can be accomplished with hydraulic equipment. In order of usefulness, these are: rigging and load handling, bolting, mechanical cutting, tunneling and excavating, grappling, and drilling.

Rigging and load handling equipment tested includes hydraulic cylinders for jacking and pulling, and a small hydraulic winch. The single-acting jack with various extensions, end connectors and accessories is typical of the hydraulic sets sold to industrial firms.

A pressure compensated winch with a hydraulic power handle was tested. The winch, which weighs only 13 pounds in the water, has a line capacity of 50 feet of three-eighths inch diameter rope.

Both hydraulic and pneumatic impact wrenches were tested. While the pneumatic tool proved to be light and relatively easy to handle, it had definite depth limitations and required excessive maintenance. The hydraulic impact wrench was found to be very effective for drilling, tapping, and bolt impacting.

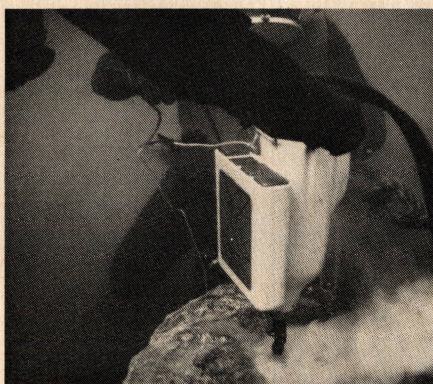
NCEL is also engaged in the investigation of hydraulic power supply for underwater salvage operations. There are three basic methods of getting power to the tools, each with its special advantages and disadvantages.

The first method is to transmit diesel generated hydraulic power from a surface ship to the undersea work site. This

is the easiest to use in some respects, since there are few deployment problems. The main disadvantage is that this system loses its effectiveness at depth.

The second power system is to supply electric power, again from a surface vessel, to the 440V AC electric motor used to drive the hydraulic pump on the bottom. This reduces power losses. Deployment problems may arise, however, in view of the fact that the support vessel must be equipped to raise and lower the bottom components, weighing about 1000 pounds in air and 600 pounds in the water. Again, surface support is required.

The third method is the seafloor battery-powered submersible unit, which can operate independent of the surface during the life of the batteries. These units have very low transmission losses and are pressure compensated so no water can intrude. On the other hand, this is the heaviest unit of all, and therefore the most difficult to deploy. It also has a finite energy capacity, limited by the amount stored in the batteries, which



Hand held underwater hydraulic rock drill.

must eventually be recharged, either on the bottom or back on the surface.

NAVSHIPS is involved in a vigorous program to develop and to incorporate the latest in salvage equipment and techniques into the Navy Salvage Forces. As its part in this program, NCEL is carry-



NCEL tested hydraulic wrench and grinder.

ing out development and testing in areas of pontoons, diver tools, diver heating, diver's gas purity, chemical gas generation for buoyancy, anchors, oil pollution control, and fire protection in hyperbaric chambers. For more information, contact John Quirk, SUPSALV Coordinator, Naval Civil Engineering Laboratory, Port Hueneme, Calif. 93043.

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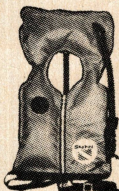
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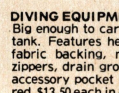
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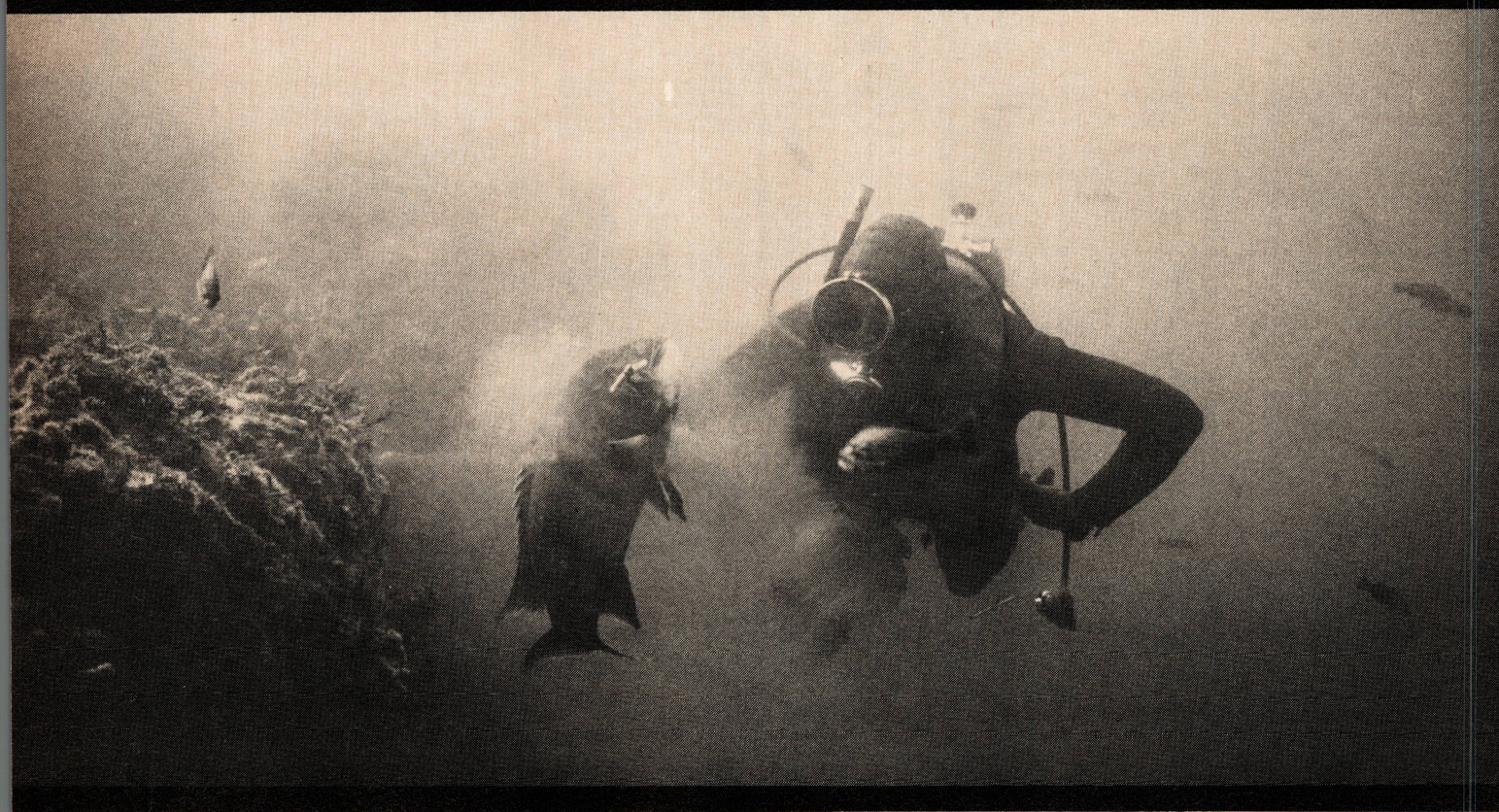
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Bill Barada's Article In Nov. skin diver



SPEARFISHING TECHNIQUES

Helpful Hints For Capturing Culinary Delights

By Jules Brenner

In writing about spearfishing I feel like the policeman in a TV drama of recent times who informed a famous criminal lawyer of police brutality, corruption and mendacity. The lawyer asked him, "Why are you telling me this?" The reply was classic: "I been lookin' around, expectin' any minute somebody'd step up and say somethin'. But nobody's doin' it! So I guess it's got to be me."

I'm no expert in spearfishing. I'm one of the guys that go to lectures by spearfishing luminaries and listen to them tell everything but the precise techniques they use to spear their fish; how they stalk, where and when they strike, where they forage. Excuse me, gentlemen, if this seems harsh criticism, but the most you've ever advised was to go out and study the fish you're interested in. Good advice, certainly. But someone starting out in the activity of bringing home a fresh fish dinner needs a little more than that.

The beginner doesn't yet need to know about the biggies: the white and black sea bass, the jewfish, the grouper, or the pez fuerte. First spearfishing experiences should be with local inshore varieties, such as the calico bass, the sheephead, the

halibut, the sculpin . . . varieties that are still abundant near our shores and islands, and that are as tasty as any fish you can get anywhere, regardless of size. I get these fish regularly . . . and these are some of the ways I do it.

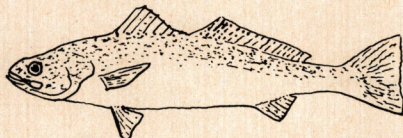
Preserving fish populations—Recently, for the first time, I hunted ducks and geese with men who have been hunting since they were barely large enough to support their shotguns. To a man, they had an enormous knowledge of their prey. But, what I found even more admirable was their true respect for the animal they stalked. Before launching into how to take fish, then, I'm compelled to express my conviction in the intense need to preserve our fish populations through knowledge and respect. Spearing fish doesn't endanger fish populations. Indiscrimination and decimation does.

Fish and Game regulations are like insurance policy premiums: they're related to population and survival ratios. Read them, know them, respect them. To do otherwise is self-defeating and ignorant. Moreover, one can and should extend his predatorial standards even beyond Fish and Game limits. If you're in an area where, let's say, the calico bass run up to 10

and 12 pounds, why bother with the 3 to 4 pounders? Raise your standards as the conditions allow.

Where to go—Tips, secrets, word of mouth advice are the most common guides on where to go for fish, but, as with many common things, they're not always the most reliable or productive. The easier the info comes, in fact, the more likely it'll turn out to be worthless. To say you've got to consider the source would be an understatement. On the other hand, one should not be so cynical and callous as to conclude that there are no altruistic spearfishermen in the land willing to share their best secrets with you. Whether their motive in telling you comes from friendship, bravado, expansiveness, loneliness or naivete, take advantage of their disclosures. Get them to take you to their spot, if you can. It'll more likely be a worthwhile area if they spend their own diving time on it. What's more, you don't have to worry about finding it. And . . . it's amazing how many additional facts will come out on the way.

WHITE SEA BASS

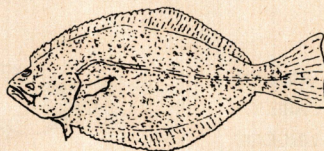


If they can't or won't take you, be sure to find out more than just the general area. I've heard many times that Silver Canyon in Catalina is great for white sea bass. But: at what depth, what conditions of current and temperature, off what landmark, on what reef or in what kelp bed and, certainly, at what time of year? Get the specifics.

In lieu of escort or tip, there are certain land and sea characteristics that could indicate fish havens. Which to look for depends on the variety of fish you're seeking. Halibut lay on the bottom, usually in a nice, sandy cove or off a straight, flat beach. Occasionally, they'll seek out some rocks and nestle in a sand grove between them. Bass, sculpin and sheephead like rocky reefs. Look for a point of land to indicate a reef, or a bed of kelp. Each kelp plant is moored to a rock, so where there's thick kelp, there's mucho rocks.

Another kind of place to spearfish is on artificial reefs, such as Fish and Game's "fish havens" (find out if it's allowed), or shipwrecks. Sheephead and sand bass flourish there. You'll even find the occasional sculpin or cabezon.

HALIBUT



The Varieties/Halibut — The tastiest morsel this side of lobs-terdom. There are those who venerate the sculpin, or extol the salmon, but for my money, this flat fellow is numero uno. Finding them is a matter of covering a lot of ground in a hurry. Since they lay on the sand, or partially buried in it, a straight traverse about four to ten feet above the bottom, depending on visibility, is necessary. Go as fast as recognition will allow, not so fast that you'll fly right past them. Scan as you go. Look for the two eyes looking up at you.

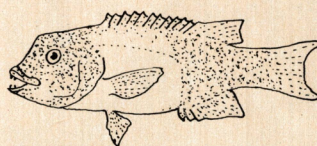
Fish that rest on the bottom characteristically depend on their camouflage for protection. They'll often let a potential predator pass right over them, so you can sometimes get very close and have ample time to aim your shot. But don't depend on it. They spook, too. Once in flight, you can forget them.

When traversing an area for halibut, stay side by side with your buddy, within good visibility range, but not so close that you're both scanning the same real estate. Often, a spooked halibut will be the first sign that you're in the right place. If, off

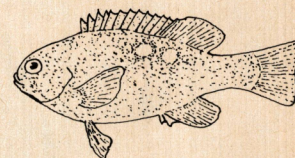
the corner of your mask you think you see a mound of sand erupt and streak away, slow down and scan more carefully. Note the depth. When you reach maximum depth, return on a parallel but different line.

When you spot one, hopefully before he spots you, the most difficult thing may be to define his body, because they sometimes are well covered with sand. Look for the outline of his tail fin. Approach from behind, if possible. Keep your gun aimed at his eyes. When you're in good range, drop your target area to his gill, behind the eyes, and fire. *Don't*, whatever you do, *relax* at this moment. Even if you do hit him, he's hardly on your stringer yet! They're such strong fighters, they'll twist off a three barbed dart if they get a nickel's worth of chance.

I usually follow the shaft as quickly as I can and firm it into the sand. This'll pin him well and inhibit him from ripping up that good meat. In this position, I'll slip my stringer through his gill to his mouth, taking the utmost caution to keep my delicate little fingers away from his very sharp and numerous teeth. They are still quite capable of inflicting great tears in your flesh. For your own safety, as well as to prevent his spooking other halibut as you continue your foray, you may want to kill him right then and there.



SHEEPHEAD



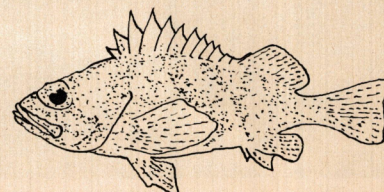
OPALEYE

Sheephead — My mother's favorite fish, though she might change her appetite if she saw what they look like. Their plain ugliness, combined with their gentle, if lethal, curiosity make them one of the more charming denizens of our reefs and wrecks. I like to take them in the 15 to 30 pound range. Sex doesn't seem to affect taste. World's record is around 36 pounds, though I swear I saw a 40 pounder on a wreck a couple of years ago. They're not, to me, as good a meal as the halibut or bass, but are a whole lot better than opaleye and a lot of other fish people eat. They're free swimmers and forage off the bottom. Their formidable, protruding teeth are dangerous only to the crustaceans they crack into.

I've encountered sheephead that wouldn't let me get closer than 20 feet, and I've encountered some that about impaled themselves on my spear point. Ordinarily, good hunting techniques will have to be employed, particularly for the older, wiser ones. Their scales are large and thick, so close firing range is usually necessary. A slight back firing angle is preferable for the same reason.

If they don't spook at first sight of you, you'll have a chance to get them. They'll often swim away, but if you're calm and quiet, will return for another look. Just follow them with your eyes and spear, moving as little as possible. If you're solidly planted as they approach, you can hold your breath. Wait till they are broadside to you and fire, aiming just back of the gill plate, slightly higher than center. If some chasing is necessary, swim as smoothly as possible, hide behind kelp or a rock as you approach, and be ready to fire at the first opportunity. Don't wait till the last moment to swing your gun into position.

CALICO BASS



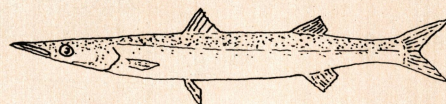


photograph by Author

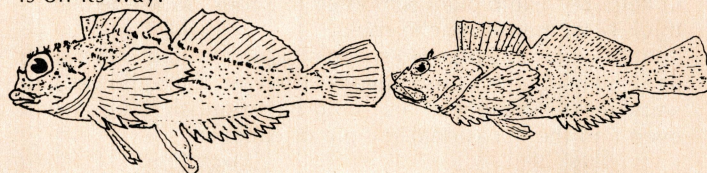
Calico bass — These fellows are cunning, and I consider a stringer full of 5 to 10 pounders a very worthwhile accomplishment. Size varies greatly with locale. Taste, when fresh, is superb. The calico loves rocks. He will range in all depths, from just below the surface to the bottom, so, if you are near the bottom, look up occasionally. They tend to spook very easily, but don't be discouraged. Even big ones will come in to look you over sometimes and you should be ready.

They will taunt you. They like nothing better than to hover motionlessly, in a perfect broadside position, until you are just in firing range, or just leveling your gun off at them . . . and then split! You'll have to outsmart them, and, lord knows, you'll have to be smooth. Watching one disappear behind a rock and waiting for him on the other side sometimes works. You'll never outswim him, so if it becomes a chase, you can forget it and pick rock scallops for a while. There have been cases, though, when I've pursued them, very slowly and easily, when they've stopped inquisitively, and wound up in deep butter and sizzling olive oil on my frying pan.

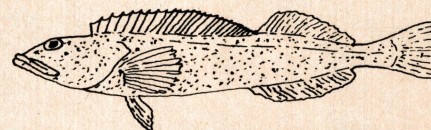
BARRACUDA



Yellowtail, bonita, salmon, barracuda — Again, curiosity kills the fish. These are blue-water, free swimmers that many will say are impossible to spear. The trick is to get into a school of them and, though rare, this is possible. On one weekend in La Jolla I speared a 28 and a 22 pound yellowtail in a 30 foot deep area where a school was wont to pass. I must have done something right because no one else in the diving party got any on either day. The rules are: breathe and move as little as you can, no jerky movements, aim carefully, don't fire too quickly, don't linger too long in aiming. If you're at a distance but still in range, you might find aiming at the fish's nose will net you more fish since he may have a chance to move while the spear is on its way.



SCULPIN
CABEZON
LINGCOD



Sculpin, cabezon, lingcod — Another variety of bottom fish that are considered by many the very optimum food fish on our coast, comparable to Hawaii's mahi-mahi. Whatever your taste preference, these are the easiest to spear.

The trick is in the recognition. They are superbly well camouflaged. They sit on the bottom in a rocky area, motionlessly waiting for a tender morsel to come their way, or a predator to unknowingly swim by. They rarely move. Even when prodded they're reluctant to go very far, though this is less true of the lingcod. You'll spot them, often, by inadvertently disturbing one with your fin, a hand, or your body, fairly forcing him to abandon his lethargy and reveal himself through movement. Shooting them however, is not much sport. It is even possible to knife them by hand, but this practice is not recommended. Too often, they'll be fatally wounded but will swim away, scoot under a rock, and die. This is no less wasteful than a fisherman throwing back small fish after their mouths have been ripped up by a hook.

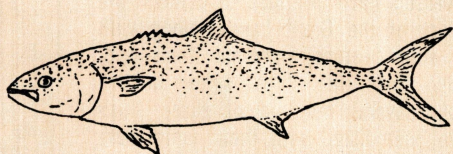
The sculpin's and cabezon's inaction makes precision aiming possible. Spear them at the very edge of their gill plate. Because of the very fast taper of their bodies, if your shot is just inches further back, it will penetrate and reduce the meatiest part, and a substantial percentage of the food portion.

Caution: the sculpin is venomous. At the tips of the large dorsal spines, in particular, and on the smaller facial spines, are sheaths of poison just waiting for the unwary predator. Handle him carefully, and with gloves, even on the boat. The poison is not usually fatal, but it is persistently agonizing.

Effective spearfishing demands control, awareness, familiarity, concentration. Safe breath control is vital. Don't forget Boyle's Law. Keep your excitement in check. Above all, don't forget your buddy. You must know at *all times* exactly where he or she is. You wouldn't feel so good if, instead of that lovely little calico swimming out from behind that rock, your own buddy popped up in front of the business end of your gun!

The apparatus one uses in spearfishing can vary enormously, from pole spear to power, from one-barbed darts to multi-prongs. Fish stringers vary enough to satisfy most preferences and, no doubt, the best may be self-designed. In any case, your pro-dive shop is your best starting point for a summary of this equipment, prices, availability, etc. Though I have a variety of spearguns for different purposes and conditions, my favorite is the old Sportsway's gun with Johnny Carroll trigger. My preferred stringer is a stainless steel rod attached to a looped, stainless steel wire.

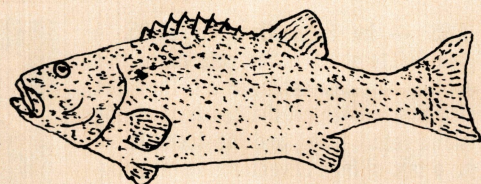
YELLOWTAIL



Great care must be taken in handling the fish after the catch. Have ice and an ice chest. Have plenty of plastic bags. Filet or, at least, gut your fish as soon as possible and get that meat into a refrigerator or freezer quick. Try to eat some of the fish while it's still fresh. Be sure to record good spots so you can find them again, and forward this info to me.

Spearfishing is challenging and rewarding, but there is more than one conception of it . . . and more than one misconception. Writing about it could prove to be controversial, though hardly anything to compare with the police scandals on that TV drama. In any case, one of the best effects of this article will be in challenging a few real "experts" into sharing their real secrets. I, for one, am ready to be criticized or corrected. Just so it leads to knowledge and a good meal! ➤

BLACK SEA BASS



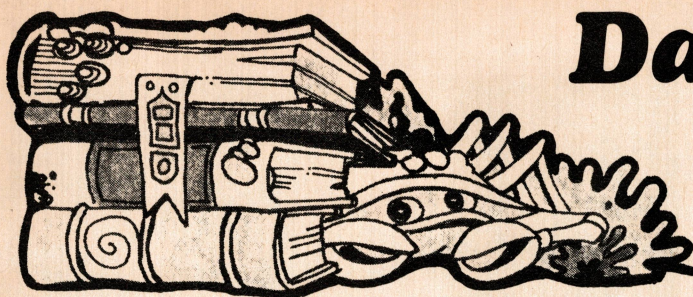
Some 554 species of fish, representing 144 families, have been recorded off the coast of California. Some of these fish are not only abundant, but tasty for the diver who knows how to spear them. Effective spearfishing demands control, awareness, familiarity and concentration, and buddies should stay together and help each other after a hit, if possible. Fish and Game regulations should be read, understood and respected.



photograph by Jack McKenney

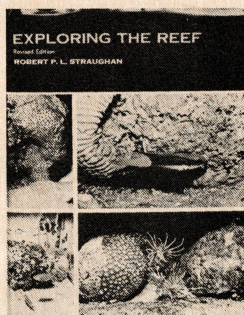


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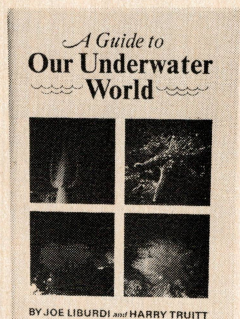


Davy Jones Review

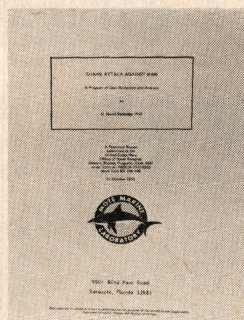
EXPLORING THE REEF — by Robert P. L. Straughan/\$17.50. A new edition of this comprehensive, practical guide to exploring a reef with maximum safety and maximum enjoyment. Identification of reef inhabitants, techniques for catching and cleaning coral, shells and tropicals, and how to set up and maintain a saltwater aquarium are among the topics discussed. Illustrated with nearly 300 photographs. **A. B. Barnes & Co., Box 421, Cranbury, New Jersey 08512.**



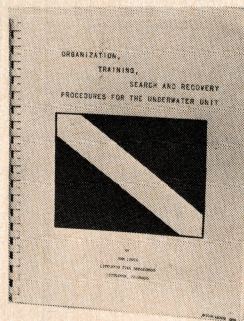
A GUIDE TO OUR UNDERWATER WORLD — by Joe Liburdi and Harry Truitt/\$5.95. Two divers, who have spent many years living with and observing sea life, have captured with photographs the underwater world in natural but vivid terms. The text identifies the creatures and, in a nontechnical way, gives many points of interest regarding them and their relationship with each other and with man. **Superior Publishing Company, P.O. Box 1710, Seattle, Washington 98111.**



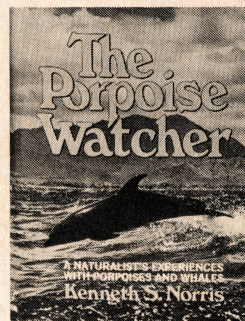
SHARK ATTACK — by H. David Baldrige, Ph.D./\$2.00. The most dramatic and least understood of all water-related accidents is shark attack, but in this work sensationalism has been cut away to look at clear, documented statistics. Data from 1165 case histories were evaluated in a search for predictability of shark behavior, and to update advice for bathers, swimmers, divers and attack victims. **Mote Marine Laboratory, 9501 Blind Pass Road, Sarasota, Fla. 33581.**



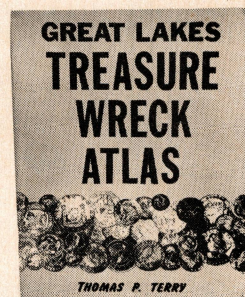
ORGANIZATION, TRAINING, SEARCH AND RECOVERY PROCEDURES FOR THE UNDERWATER UNIT—by Tom Lewis/\$4.00. A manual to assist civic underwater rescue units to become equipped and trained to provide systematic and reliable service to those persons or agencies requesting their assistance. Includes selection of members, structuring the team, and surface personnel procedures. **Tom Lewis, Littleton Fire Department, 5669 So. Rio Grande, Littleton, Colo. 80120.**



THE PORPOISE WATCHER — by Kenneth S. Norris/\$7.95. A bittersweet account of a naturalist's pioneering attempts to establish communication with wild porpoises and whales. As Dr. Norris relates his adventures in Scammons Lagoon, Marineland, and Hawaii's Oceanic Institute with these magnificent mammals, they each become individual personalities that capture the heart and imagination. Includes many photos. **W. W. Norton, 55 Fifth Ave., New York, N.Y. 10003.**



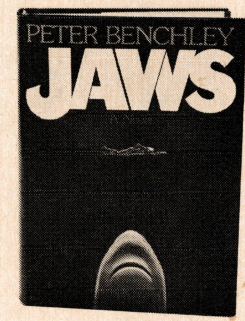
GREAT LAKES TREASURE WRECK ATLAS — by Thomas P. Terry/\$3.00. Thousands of vessels have disappeared beneath the waters of the Great Lakes, along with the ships' cargos, personal items and, many times, the ships' safes. In this book, several hundred of these ships have been listed with their name, date of sinking, place of sinking and estimated value. Includes marked maps of each of the Great Lakes. **Specialty Products, Box 1377, LaCrosse, Wisconsin 54601.**



THE NEW SCIENCE OF SKIN AND SCUBA DIVING — by Council for National Cooperation in Aquatics/\$4.95. This newly revised and enlarged textbook for basic diving classes includes requirements and skills for diving; equipment; medical aspects, physics and first aid related to diving; fundamentals of compressed gases; environment and marine life; planning a scuba dive; and many appendices. Illustrated. **Association Press, 291 Broadway, New York, New York 10007.**



JAWS — by Peter Benchley/\$6.95. A great white shark is the catalyst of this exciting new best selling novel. The killer attacks a woman off the beach of a Long Island resort town, and the scene is set for a tale of high adventure, moral struggle and final confrontation. The fast paced story includes diving scenes and powerful descriptions of the great white in action. This is a thriller which should hold readers to the very end. **Doubleday & Co., 277 Park Ave., New York 10017.**



THESE BOOKS ARE NOT AVAILABLE AT SKIN DIVER MAGAZINE

FILM FEATURES VIRGINS

Little Dix Bay and Caneel Bay, in the Virgin Islands, are featured in a new 27 minute color 16mm film produced for Eastman Kodak Company. The film describes the adventures of a family of three when they visit the two resorts and are instructed in snorkeling, scuba diving and underwater photography. Except for the opening sequence showing the family's arrival at the St. Thomas airport, all footage was filmed at these two resorts and in the surrounding waters. Throughout the film, emphasis is placed on the beauty of tropical fish, coral reefs and shipwrecks.



Diver explores the wreck of the Rocas at the Aneгада Reef, British Virgin Islands.

The underwater photography at Little Dix Bay was by Stan Waterman, a highly experienced and creative photographer. He filmed some especially beautiful sequences of the wreck of the Rocas at Aneгада Reef, and of the wreck of the Rhone, near Salt Island. Smokey Roberts, another veteran underwater photographer, filmed the underwater sequences at Caneel Bay. 🐠

VIRGIN ISLANDS U/W PARK PROPOSED

Citing the ideal weather conditions, clarity of water and convenient location, former spearfishing champions Ron and Valerie Taylor have proposed that the waters surrounding the U.S. Virgin Islands be preserved as an underwater national park. The Taylors consider the islands "one of the top spots in the world" for sport diving and photography.

The husband-and-wife team recently spent 10 days diving the Virgin Islands waters, taking photographs for a book in Time-Life's wilderness series. "I don't know if you realize what you've got here," Valerie told local officials. She noted that she and her husband had seen more examples of underwater life there than anywhere else they'd photographed in the Caribbean while on assignment.

The Taylors' credentials in the U/W world include working on the film *Blue Water, White Death*, the soon to be released *Jaws*, and producing their current television series. 🐠



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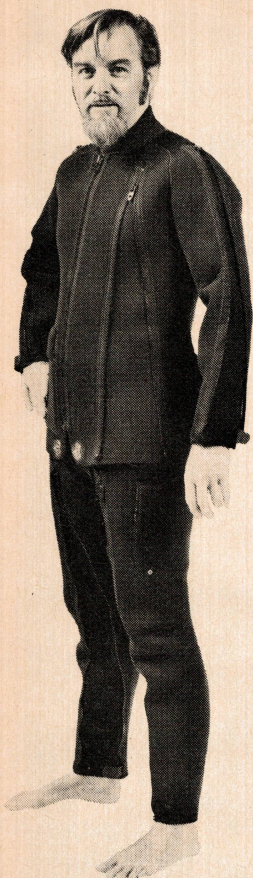
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The Zip-On Wet Suit

A formfitting wet suit that fits like a suit of clothes

By Jack McKenney

"To stay warm, it should fit snugly!" Do you remember your diving instructor telling you that about wet suits? That's why you went out and purchased an expensive "made-to-measure," formfitting suit — perhaps a one-quarter inch farmer john model with a hooded jacket. And in order to get the greatest amount of wear from it, you ordered it with nylon on both sides. The suit worked so well underwater that even in winter you could use it to dive under the ice and remain comfortable for periods up to 30 minutes.

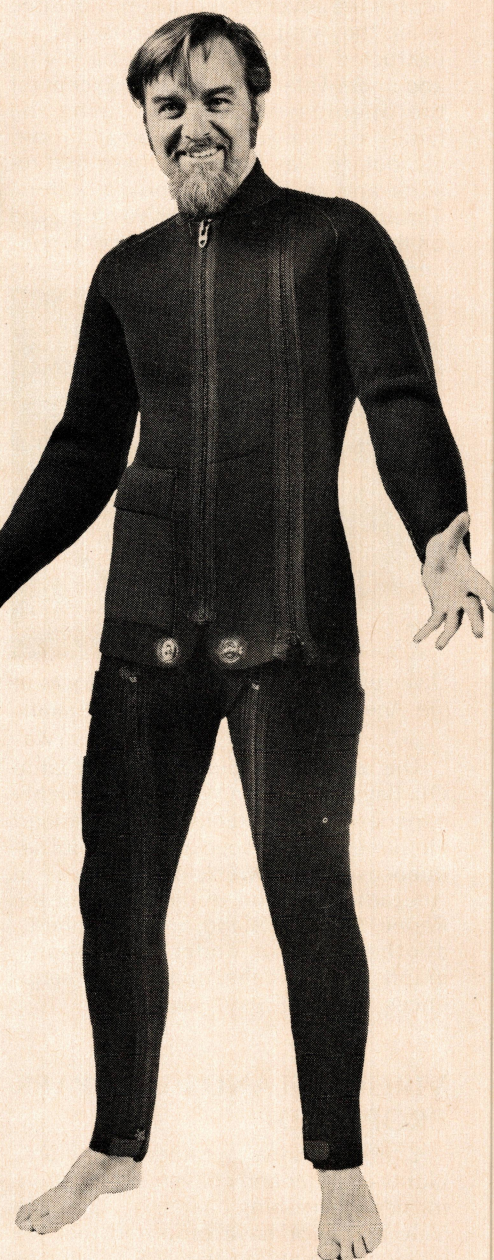
But in the summer, after a dive in water temperatures of 55 degrees, when you climbed back aboard the boat to change tanks, rest, or to eat lunch, things began to get uncomfortable. Topside temperatures may have ranged between 70 and 90 degrees, but you didn't want to go through the hassle of taking the suit off, so you suffered for 30 minutes or so, with perspiration running down your face, getting dizzy spells and almost passing out. What a relief when you finally hit the cool water again . . .

Well, if you're the type of diver who dives in warm climes, but in cold water,

then Henderson Aquatics, a New Jersey wet suit manufacturer, may have just the suit you've been looking for. It's a formfitting suit that is adjustable. In the water it fits like any other well-made tailored suit, but there are five extra zippers running the full length of either the trousers or jacket that can be unzipped while topside, allowing for circulation of air and freedom of movement. It's almost as though you have your street clothes on when the zippers are undone. All of the seams are glued, then tightly stitched with Dacron thread, and the neoprene is American-made Rubatex.

Henderson uses only top quality Talon® zippers which are noncorrosive nickel-silver zippers, threaded with wear-resistant Dacron. Two of the zippers run from the end of the shoulders down the outside of the arms to the wrist, and a third one in the front of the jacket is offset about four inches from the main jacket zipper and runs from the shoulder down to the waist. Two more run from the top part of the thigh down the front of the pants and along the inside of the leg to the ankles. And there are two shorter ones, one on each side of the pants, that run from the waist to the top of the hips. These measure about eight inches long.

The suit isn't made with separate pieces of neoprene glued and stitched behind the zippers; instead the zippers are sewn over the loose fitting legs and arms, which are made with one solid



sheet of neoprene. Part of the fitting adjustment for individual sizes in a custom order are done by adjusting the zippers the correct width when they are open prior to sewing them to the suit. This way, there is no way for water to enter the suit at these points. When the zippers are closed the neoprene folds snugly against the body and eliminates any water entry. At the bottom of each of the long leg and arm zippers is a velcro tab which folds over and fastens across the zipper preventing it from coming open.

The Zip-On comes with the standard zipper down the front of the suit, a jacket pocket, pants pocket and knife pouch on the right thigh. Prices range from \$195 to \$213. Costs will vary depending on color, and whether or not nylon is desired on both sides. A chest pocket is also available for an additional \$4.50.

The suit we ordered for our test was a black one-quarter inch nylon outside with smooth skin on the inside. It was custom made for Art Smith, our art director, a veteran diver of many years experience. Quite frankly we anticipated that with the extra folds of neoprene bunching up on the inside behind the zippers the suit would be quite restrictive. And we also felt that it would allow for extra room where water would be able to flow easily, thereby cutting down on the efficiency of the suit. I wondered if the extra comfort the suit provided topside would be a trade-off for loss in warmth and added bulkiness underwater.

But it didn't happen that way. We made a run over to Catalina Island with Tom Ebro, aboard his Sea Ray, and tested the suit at Ships Rock. Without a doubt the Zip-On is one of the easiest wet suits to get into. Although the smooth skin was on the inside, we didn't need talc for "gliding-in" assistance because with the zippers open it was just like putting on a pair of jeans and a loose fitting jacket. A

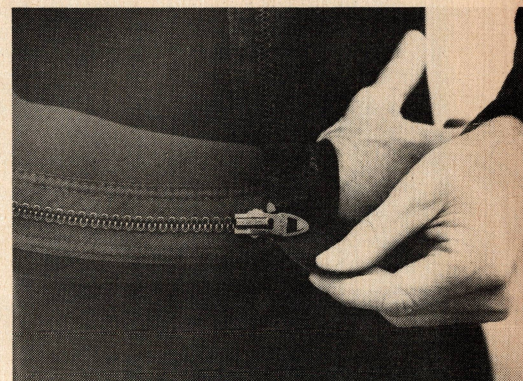
nice feature about the Zip-On is that even if you end up waiting for ten minutes on deck with all of your gear on — tank, inflatable vest, mask, fins, etc. — you can unzip the leg and arm zippers and relax until it's time to hit the water. With the zippers done up, the suit fit Art well and didn't appear to be binding.

After the dive, I asked Art if he felt the suit was as warm as any of the other wet suits that he's used in the past, and also about the comfort. Doffing his tank and other accessories and unzipping the suit before sitting down to relax, he said, "You know, the suit is as comfortable underwater as any that I've ever used, and it's much warmer than most. I thought there would be a continuous trickle of water flowing up along the edge of the folds, but it fits so well it just didn't happen." I was envious as he sat there comfortable as can be, as I struggled out of the tight-fitting, hooded, zipperless jacket I was wearing.

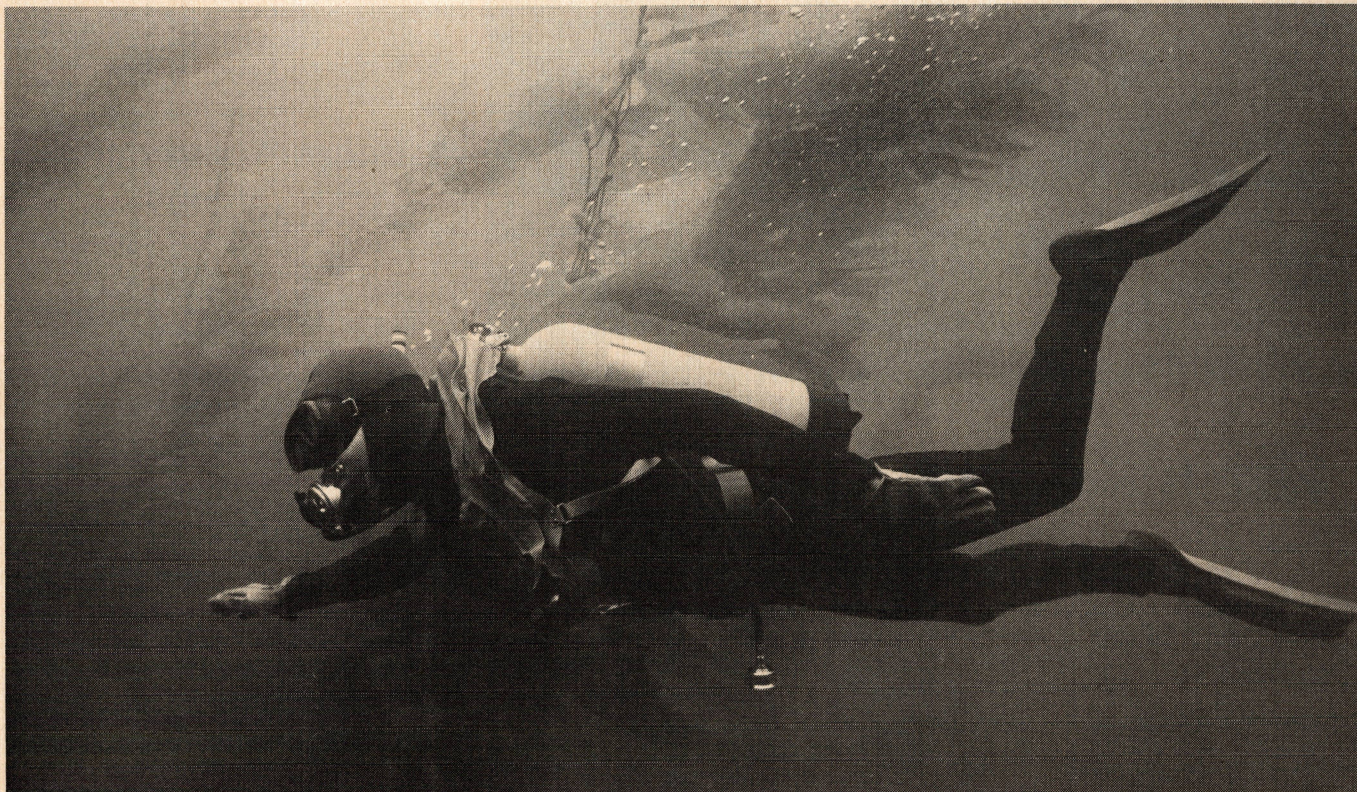
While we sat there I reflected on this sport of ours. It's a fun sport — or at least it's supposed to be. But how can you tell a new sport diving advocate that he's having a lot of fun when the rental suit he's wearing fits so badly he's freezing to death? To be sure, in cold water diving the thing that turns a newcomer off the fastest is inadequate body protection resulting in rapid heat loss.

We still have a lot of improvements and new developments coming down the road in the realm of diver comfort, but the Zip-On is a fine innovative design that is helping to make this sport of ours the fun sport that it really is. For more information write to Henderson Aquatics, Buck and Sasafra St., Millville, New Jersey 08332. 🐬

PRESTO! Zip it up and the Zip-On wet suit by Henderson Aquatics is ready to keep you warm while you brave the chilly deep. Unzip while topside and you're as comfortable as though you were in street clothes. Velcro tabs keep zippers closed.



photographs by Author



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UPS U/W FILM SHOW

Saturday, November 23, at 8 pm, the Underwater Photographic Society of Los Angeles will host its twelfth annual International Underwater Photographic Exhibition at the Santa Monica Civic Auditorium, in Santa Monica, California. The two and a half hour film and slide presentation will feature such notables as Bill MacDonald, Clint Degn, Paul Tzimoulis, Bob Hollis and Jack McKenney. The talented group of film artists will



take the audience from the war-ravaged battleground of Truk Lagoon in Micronesia to Bonaire in the Netherlands Antilles. Australia will be featured as well as diving off California, and an old time underwater film produced back in the early 1930s will be one of the highlights of the evening.

Tickets are \$5 and may be obtained from the box office at the Santa Monica Civic Auditorium, 1855 Main Street in Santa Monica, California 90401. 🐟

EMERGENCY SEMINAR

Injuries from marine animals and diver lifesaving are just two of the many subjects to be covered by speakers at the YMCA sanctioned Mid-Atlantic Diver Emergency Seminar, which will be held at the Bethlehem YMCA, Bethlehem, Pennsylvania, October 18, 19 and 20, 1974. Other subjects to be covered include: Red Cross multi-media first aid training, American Heart Association CPR training, and diver lifesaving with complete scuba gear.

The program will consist of two and a half days of activities with practice in the skills of self-rescue, water entries and approaches, rescues and assists, tows, carries and lifts, and resuscitation. The purpose of the seminar is to provide divers with the proper emergency procedures required to cope with any water related problems, to prevent further injury through mishandling of injuries and to help prevent diving deaths.

For further information, write to: Diver Emergency Seminar, c/o Garden State Underwater Recovery Unit, Box 404, Milford, New Jersey 08848. 🐟

DIVERS' SCHOLARSHIP FOR STUDENTS

Applications are being accepted for the second Our World/Underwater Scholarship which will be awarded on May 3, 1975. This \$5,000 scholarship is in the form of active participation in field studies comprised of a series of exposures in specialized areas of underwater research and endeavors. It is made up of expeditions, research trips, laboratory and photographic assignments, underwater equipment testing and manufacturing, for a one year period.

The scholarship is open to any high school senior or college student (undergraduate or graduate) who meets the following requirements: 1) male or female over 18 years and under 25 years of age; 2) certified diver with national certification (and a statement from instructor or school regarding proficiency); 3) high academic standing; 4) a completed application with all requirements, letters of recommendations etc., fully completed and submitted to the committee prior to midnight, December 31, 1974.

The scholarship will be awarded by the Our World/Underwater scholarship committee on the basis of the applications submitted. The committee consists of Dr. Joseph MacInnis, Joyce Markstahler, Dr. Arthur Bachrach, Dr. Glen Egstrom, Al Giddings, Harry Shanks, Dr. Lee Somers, Paul Tzimoulis, Mike Wagner, Dr. John Warme, and Mark V. Bensen, the first scholarship recipient.

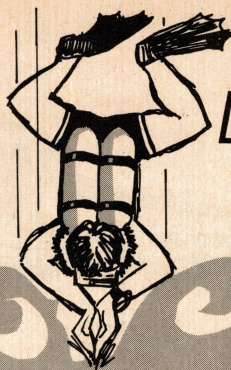
Application forms and instructions can be procured by writing to Our World/Underwater Scholarship, P.O. Box 643, Wheaton, Ill. 60187. 🐟

HELIUM UNSCRAMBLER

Helle Engineering has been awarded a contract to build three-diver helium unscrambler communicators for the U.S. Navy. Now navy divers, working at great depths, will be able to speak through a helium atmosphere and have their "Donald Duck" helium induced voices translated to a normal voice level which can be understood aboard ship and by fellow divers.

The three-diver helium unscrambler is a major "first" in underwater communications, according to Paul Krupsaw, national sales manager for the company. Krupsaw states that "Navy divers will now have the advantage of multi-team diving in deep ocean environments and be provided a preventative safety measure by effective undersea communications with a normal voice tone."

For the San Diego based company, the development of the helium unscrambler culminates years of effort in the design of sophisticated electronic communications for the diving community. 🐟



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News Briefs

By Hillary Hauser

GUILTY PLEA

Florida diver Tom Gurr, who made national headlines when he allegedly threw back into the sea all of the treasure he had salvaged from the Spanish galleon *San Jose* (News Briefs, May), has pleaded guilty in a Ft. Pierce, Fla., court to conspiring to commit grand larceny. The state attorney's office said that Gurr agreed to return artifacts valued over \$100,000 in exchange for a negotiated plea.

KILLER FILM

Stan Waterman (Waterman Film Productions) spent six weeks, beginning July 1, in British Columbia filming *Living with Killers*. It is the first film shot with killer whales in their natural environment and is about two young Canadian scientists who have established communication with a pod of killer whales. The film will show the two extending the rapport to physical contact. The actual production area is 200 miles north of Vancouver, B.C.

COT PLAGUE

We haven't heard much about the Crown of Thorns menace lately, but it's apparently not because the problem has diminished. Recent world press stories indicate that "great hordes" of the coral-eating starfish are chewing their way southward along the Great Barrier Reef. Some scientists estimate that as much as 65 percent of the 1250 mile reef has been attacked. The principal plagues have occurred near populated areas. Sydney photojournalist John Harding recently reported seeing the starfish as far south as Latitude 20° (Tropic of Capricorn). Former observations had placed the coral killing menace at Latitude 21°22'.

EDWIN LINK DEVELOPS FISH FOR SUBMARINE RESCUE

Edwin A. Link has created a remote-controlled rescue device for trapped submersibles. It's been dubbed *Fish* and is scheduled to be finished this month. The 680 pound aluminum and steel horseshoe-shaped mini-sub will also double as an unmanned research craft. *Fish* is equipped with sonar and television to locate a trapped submarine and to spot rescue hazards. It also has a remote controlled hook which can latch onto a disabled sub at special hooking points. When the hookup is completed, the 24 foot manned rescue launch on the surface (whose position is stabilized over the site by use of thrusters) can winch both *Fish* and the sub to safety.

Link was motivated toward the \$600,000 *Fish* project by the tragic accident involving *Sea Link I* on June 17, 1973, in which his son Clayton, 31, and veteran submariner Al Stover, 51, died. Link is determined that such accidents will not happen again. *Sea Link I* and *Sea Link II* (which is scheduled for completion this month, along with *Fish*), will be equipped with certain safety devices. These include: 1) A location buoy — an orange plastic balloon that can rise on a 1200 foot line to the surface so that rescuers can determine the exact location of the trapped sub; 2) Three independent electrical systems, one of which will be solely for emergency life support; 3) Dual controls for all atmospheric systems in both the diving and pilot's chambers; 4) Increased capacity for baralyme, and separation of baralyme scrubbers from the ship's power source; 5) Breakaway fittings that can pull away easily if snagged.

The *Fish* rescue system will not only be applicable to the *Sea Link* subs, but can also be used by the 35 other small research subs currently in operation. Link hopes that with the *Fish* system, *Sea Link* devices will never again be dependent upon anyone else for rescue.

BREATHING FLUID

An industrially produced coolant liquid can be used as a breathable, oxygen-bearing liquid and also as artificial blood. U. of Cincinnati scientist Dr. Leland Clarke Jr. says he has dropped rats, mice and cats into the stuff and watched them breathe normally. Clarke suspects that breathing the liquid is very much like inhaling a gas. The liquid is used in medicine as an oxygenated fluorocarbon. Clarke says he's completed pre-clinical work on the project and hopes to move into human testing.

FNA FORMED

The Foundation of Nautical Archaeology has been formed in Iowa. Currently the Foundation (FNA) is instructing certified divers in methods of U/W search and recovery, submitting a proposal to the U.S. Army Corps of Engineers to conduct an archaeological survey in various areas of the Mississippi River, compiling a handbook on U/W search and recovery methods, proposing the establishment of a center in the Bahamas, and outlining a documentary film. For info, write FNA, Box 1227, Iowa City, Iowa.

RAFT SURVIVAL

A survival kit containing a bottle of sugar, fishing hooks, a spear and a small sun-powered still is all that two naval aviators took with them to make a raft journey from Oakland, Calif. to Hawaii last July. The two, Chuck Gore, 27, and George Sigler, 29, developed the SIG II survival kit, which they plan to sell for \$217, and their 2100 mile trip is to prove that it works. For food the two planned to grab small sharks and fish, and will drink 10 ounces of water each day. Doctors said that they would probably lose between 40 and 50 pounds each during the 60 day trip.

WATCHING WHALES

The American Littoral Society has asked people who find beached whales, dolphins and seals to report them to proper authorities. Sick animals may be helped if immediate action is taken, and dead animals can also be studied by marine biologists. On the East Coast, report stranded animals to Sandy Hook Marine Lab, N.J. (201) 872-0200. In Calif., call Tiburon Marine Laboratory (415) 435-3145, or the Southwest Fisheries Center, LaJolla (714) 435-2820. In the state of Washington, call the Northwest Fisheries Center (206) 527-3501. You can also call the curator of Marine Mammals at the Smithsonian Institution in Washington, D.C. (202) 381-5151.

DOLPHIN COUNT

Since dolphin hunting was banned in the Black Sea in 1965, their numbers have trebled. Soviet scientists recently conducted a three-month census of the dolphins and found that their population had multiplied to 800,000.

TITANIC MEET II

150 members of the Titanic Historical Society met aboard the *Queen Mary* last spring to reenact the 1912 sinking of the liner after it struck an iceberg. Guests dressed in the style of 62 years ago, an orchestra played the hymn "Autumn," (the last tune played on the *Titanic*), a life boat drill was conducted, and eight distress rockets were fired. The movie "Titanic" starring Clifton Webb was shown in an adjoining room. The bartender at the event was reported as saying, "I've worked four things today . . . a high school prom, a beauty pageant, a 1952 class reunion, and this. This has to be the weirdest of all."

WARSHIP CLUE

Dr. Danny Nelson, a St. Catharines, Canada, dentist, believes he has found one of a pair of 1813 American warships sunk in Lake Ontario — either the *Hamilton* or the *Scourge*. The two ships, heavily overloaded with cannon, carronades and other arms, were looking for the British fleet during the War of 1812 when they sank in a sudden storm. Nelson has used U/W scanning equipment to locate a 60 foot ship in 300 feet of water, which he believes to be one of the lost ships.

ROYAL AWARD

Last winter, Col. William Royal of Nokomis, Fla., was awarded an engraved plaque for his locating and reporting prehistoric remains at Warm Mineral Springs, Florida. Three years ago, Royal found a skull in the springs and left it there. He then spent two years trying to locate a professional U/W archaeologist to study, excavate and preserve the site. In February of 1973, W.A. (Sonny) Cockrell of the Bureau of Historic Sites and Properties, led an expedition of archaeologists and professionals to the site to conduct U/W excavations. Carbon 14 tests showed Royal's skull to be over 10,000 years old — the oldest verified human remains recovered in eastern No. America.

SEA CURES

Researchers at the Medical University of So. Carolina have found that extracts from the lowly sea pork seem to inhibit tumors in lymph glands. Meanwhile, U. of Wash. (Seattle) scientists have found that aequorin (the substance from the *Aequorea aequorea* jellyfish that gives it its glow) can monitor calcium changes in the human body that signal the onset of certain diseases.

NOGI '73

In case you missed it, the Underwater Society of America's NOGI Awards for 1973, which were announced in May at the Our World/Underwater program in Chicago, are: the late Ron Church (arts), Dr. Arthur Bachrach (science), Bernie Empleton (sports/education), and Zale Parry Neuman (distinguished service).

SCRIPPS NEWS

A decompression table for flying after diving is being developed at Scripps Institution of Oceanography, La Jolla, Calif. The Institution is also developing procedures for emergency diving situations. According to Jim Stewart, diving officer at Scripps, procedures will specify where the decompression chambers are, who makes the call and how transportation is handled.

BONE DISEASE STRIKES DIVERS

Dysbaric osteonecrosis, or bone necrosis, is a disease that often strikes divers who go too deep, stay underwater too long or work when they are overweight. Symptoms of the disease often appear after it's too late to treat it. The bone actually collapses around hips, shoulders or in limbs, and requires replacement by plastic or metal fittings. It occurs when tiny air bubbles block blood vessels in the bone, which receive very small amounts of blood. The blocked areas of bone eventually die and collapse.

Dr. Carl Edmonds, director of Sydney's Navy School of U/W Medicine, suggests that working divers get an annual examination and X-ray to detect bone necrosis. It has been speculated that 10 percent of constant divers get the disease, but among less careful divers (abalone and pearl divers) the figure rises to 50 percent. However, Dr. Art Bachrach of the Naval Medical Research Institute, cautions against such figures and any supposed treatment. "The etiology of the disease is not entirely agreed upon, nor is the percentage of occurrence," says Bachrach.

DATE CHANGE

The Japanese have postponed the opening of the 1975 International Ocean Exposition in Okinawa four months. The Ocean Expo will be open from July 20, 1975 to Jan. 18, 1976 rather than the March through August, 1975 dates originally scheduled. The theme of the Expo is "The Sea We Wish to See," and featured exhibitions and pavilions include an aquapolis (floating city of the future), pavilions on fish, ships, science and technology, as well as a marine mammal park.

WAVE POWER

Ocean waves may be harnessed for energy, and there is already a simple wave pump for generating electricity aboard a ship. John D. Isaccs and David Castel of Scripps Institution have developed a pump consisting of a 200 foot long plastic pipe with a check valve. The pipe is mostly submerged, with the valve near the top of the pipe.

As the pipe heads through a wave trough, water flows past the check valve, which closes when the peak of the wave is reached, trapping water above the valve. With another wave, more water enters the pipe forcing the water above the check valve into a tank on board the ship. The water is pressurized before being sent through a turbine to produce electricity.

AUSSIE CUTBACKS

The Royal Australian Navy's School of Underwater Medicine has been severely scaled down by government officials who have initiated wide cuts in defense spending. According to Sydney photojournalist John Harding, news of the cutback came as a "severe shock" to the Australian diving community. The only other decompression chamber in Sydney is at Prince Henry Hospital, but this is not suitable for severe cases as the chamber apparently has no real depth capabilities.

The school had been conducting experiments having to do with diver safety — including tests on the SOS decompression meter following a number of serious bends cases, an investigation into the hearing loss of divers, as well as treating dozens of bends cases from all over Australia and the Pacific.

ODDS & ENDS

Hannes Keller has designed a decompression calculator for repetitive dives. The triangular slide rule-like device is to be used together with the meter to plan dives and is distributed by Aquastar, Geneva . . . Vietnam vet Tom Tata, 27, has formed a dive club in Davie, Fla., for former GI's who are amputees and paraplegics . . . A giant turtle carried a shipwrecked woman on its back for two days and saved her life. Candelaria Villaneuva, 52, was aboard a ship that sank in the Philippines on June 2, and was finally rescued by a Philippine Navy ship after riding the turtle at sea for 48 hours . . . This month Stan Waterman is working with ABC-TV on a shark special with Peter Benchley, author of "Jaws," in the So. Pacific. Waterman also recently completed the shooting of an ABC "American Sportsman" special on treasure wreck diving with Teddy Tucker in Bermuda . . . Scubapro plans to include the US of A's "Do's & Don'ts of Spearfishing" in all speargun packages.

A physician's
point of view



Why I say "YES" to diving

By Murray Grossan, M.D.

Physicians are often asked to conduct a physical examination for patients who are applying for a job, football team, or even marriage. Because of my interest in diving, I have a frequent opportunity to examine and certify individuals for scuba diving. Doctors should be objective and scientific in their decisions but I must confess that when it comes to diving, I tend to be highly prejudicial in order to say "yes" to diving.

My first observation of a new applicant is whether or not his mother is along. If a gal has her mother along, I know I'll be given one of the following reasons why mother feels Susie shouldn't dive: she's too tall, she's too short, it'll ruin her hair, it's the wrong time for her. When a young man comes with his mother, the excuses are even more outrageous. Some examples: He is never able to take a bath except in hot water. He should quit smoking before he dives, don't you think? He's so clumsy I'm sure he'll kill himself.

On the other hand, when an applicant comes by himself, I may have to use a crowbar to get information out of him that might keep him out of diving because by the time the diver comes for his physical, he wants nothing to stand in the way of his being certified.

Actually I find only two main reasons that automatically keep an individual from scuba diving, epilepsy and a ruptured eardrum. The ruptured eardrum we usually repair and then the patient may dive. However, the peculiar factors involved with scuba diving make epilepsy an absolute "no no." There are other problems which may keep a person from diving, such as serious heart or respiratory problems, but these vary greatly from individual to individual and people should check with their physician before categorically excluding themselves from the sport.

I find that scuba offers a very important emotional experience that is needed in today's kind of living. We are born with a nervous system geared for jungle flight and hunting. Sitting in an office all day and watching television in the evening gives virtually no vent to this nervous system. Facing the unknown with its pleasures and dangers beneath the ocean can give anyone enough excitement, thrill and challenge to last from dive to dive. And diving forces you to rely on your personal ability and come to terms with nature as it actually is — cold water, poor visibility, the equipment that you must make perfect. This is a far cry from turning the key and starting a 100 horsepower motorboat and taking off across the lake.

What about the middle-aged, paunchy person who wants to dive? I encourage him for he will have a motivation for getting into good physical conditioning. It is true that some lives are lost in diving but it is also true that many, many lives are lost by people who allow their physical condition to go to pot. Regrettably, even joggers are mugged or run over by cars, and in the final analysis, anything that will get a person to build up his physical stamina is going to be beneficial. No one needs to be

told that he has to stay in shape in order to dive and the prospects of diving are generally enough motivation to help the individual acquire better habits. A large number of my divers have given up smoking. The motivation for diving has encouraged individuals to correct physical problems that they might have put off, such as, hernia surgery or back surgery.

Diving, because it is such a tremendous stimulus, has been used by psychologists to correct serious disorders. Some psychologists have used the contract of teaching scuba diving (or for that matter sky diving) to individuals in order to get them off narcotics and the results have been very encouraging.

At what age should a person not dive? I've met many divers who are collecting social security. Indeed, it is ironic that one woman, a grandmother, was diving with her grandchildren. Her own two sons are unable to dive as one has lung disease due to excess smoking and the other has rapid heart palpitations. She was making three dives a day and didn't tire. So, I really see no objection to a grandparent diving. As to how young, I believe the NAUI rules are correct on this matter. But I have encouraged my youngest son to dive with tanks in the pool since early age in order to help him become accustomed to diving as something natural and easy without anxiety.

As for the teenager, I can think of nothing that would mature a person better than scuba certification. Here he must learn to work in a group, follow orders, and keep a cool head. And, he knows that drugs, alcohol, or smoking will prevent him from being a good diver. As to diving itself, aside from the pleasures involved, there is a future world in which virtually every field of endeavor — engineering, botany, biology, archaeology, medicine, etc. will use scuba and underwater techniques. This skill will help an individual just as driving a car or flying an airplane, or learning to type.

Twenty percent of our planet is land and the rest is water. How better to comprehend and appreciate the wonders of nature than to be able to see this planet beneath the sea? No matter what your life's work may be, you can't help but get a different perspective when you're below the ocean's surface. It is still hard to believe that the most desolate wasteland beach may have a world of color and beauty beneath the water. Many of the skills that you have on land — navigation, photography, knot tying, nature study, etc. can be adapted into a totally new world. I suppose I encourage diving because I wouldn't want anyone to miss this. Diving is simply like nothing else in the world; it is not like walking, or climbing, or watching television. It motivates you to plunge into cold water, lug tank and gear down mountains, get up at five in the morning to get to the dive boat or fly 3000 miles to Cozumel.

Finally, diving gets you to a place of quiet, a respite from traffic, people, noise, or telephones. You are weightless, you can glide or soar, leap or swim or float. There is just no other experience like it. 

Ocean Gallery

The Purple Striped Jellyfish



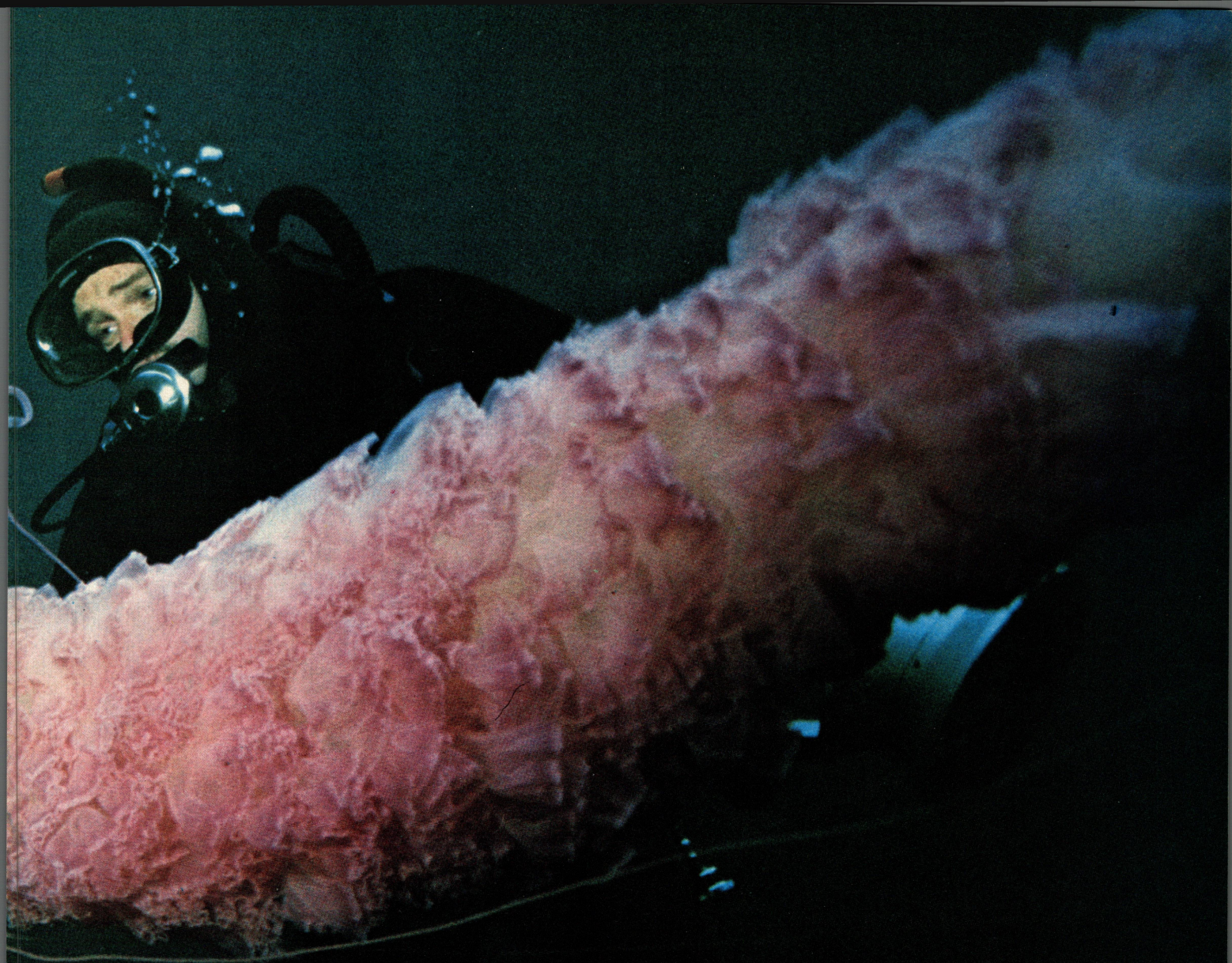
Text by Sherna Hough — Photograph by Jack McKenney

If a person's only experience with birds is to see a dead pigeon in Central Park, what can that person know about birds? How could he understand the beauty of flight? How could he ponder the delicate balance of gravity? Similarly, if a person's only experience with jellyfish is to see a pathetic blob on the beach, what can he know about jellyfish? Only the diver, who can experience jellyfish in the animal's own environment, really delights in this coelenterate of the class Scyphozoa.

The purple striped jellyfish, *Pelagia panopyra*, is a disk jelly which is found in temperate waters of the Eastern Pacific. Along the western coast of the United States, it is usually seen in the spring and early summer, often in great shoals of many thousands of individuals. Its distribution relies entirely upon the currents, however; the ineffectual swimming it does by gracefully contracting and relaxing its bell serves as much as a feeding mechanism as it does a means of propulsion.

The bulk of *Pelagia's* diet consists of zooplankton removed from suspension in the water column. It can also eat small fish, however, by stinging the fry with the nematocysts, or small stinging cells, along its tentacles. It is these nematocysts which make jellyfish in general an animal feared by man, for in a few species the sting can be fatal. Unless a person is unusually sensitive, however, the sting of *Pelagia panopyra* will only cause a mild irritation which will disappear in a relatively short period of time.

Although the jellyfishes' tentacles are the appendages which divers should avoid, it is the *Pelagia's* pink "ruffles" which catch the eye. This beautiful flowing mass is actually a series of oral lobes which bear the mouth openings of the animal. A number of creatures live in commensal relationship with the purple striped jellyfish, including small *Cancer gracilis* crabs and medusafish. Animals that feed on *Pelagia*

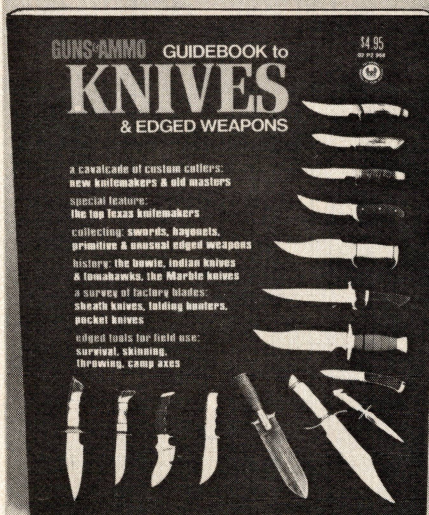


include sunfish and sea turtles. *Pelagia* are dioecious animals — that is, individuals produce either eggs or sperm — and reproduction is accomplished by the simultaneous release of eggs and sperm into the surrounding water.

According to Rim Fay of Pacific Bio Marine Supply, purple striped jellyfish only live for one year, dying soon after the young have been shed during the summer. The jellyfish larva, called planula, float around all winter until they attach and change form to the scyphistoma phase. The scyphistoma subsequently divide, resulting in the liberation of juvenile jellyfish which begin to mature in the spring when the seasonal bloom of plankton can nurture their phenomenal spurt of growth. Within six months the tentacles can grow to be over eight feet long, drifting along in the currents where the diver who meets them on their terms may delight in their delicate, living beauty. 🐙

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Beneath-the-Surface is a non-profit, educational membership organization which encourages not only adventuring into the sea, but a desire to go to the heart of things, "seeking universal functions under the external veneer." To that end Director Sid Anderson started trips called Adventures in Marine Biology to the Bahamas in 1959, and since then hundreds of divers of all ages have gone on these Caribbean dive-study vacations.

Past seminar leaders include: Dr. Victor Springer, curator of fishes at the Smithsonian; Dr. Eugenie Clark, author of *Lady and the Sharks*; Dr. John Storr, coral reef ecologist; Bob Straughan, professional collector and editor of *Salt Water Aquarium*; and Dr. Jim Tyler, TEKTITE diver of Philadelphia's Academy of National Sciences. New programs are being developed all the time, for adventures both under the sea and on the land. For more information contact: Beneath-the-Surface, Carmen Hill No. 1, New Milford, Conn. 🐠

CUSHMAN WITH PERRY

Perry Oceanographics, Inc., has formed a new Perry Ocean Products division to be managed by diving systems authority Larry Cushman. The new division will be concerned with the development and the production of specialized diving equipment for Perry Oceanographics' bell diving systems and commercial submarines. Headquartered at the main Perry plant in Riviera Beach, Florida, the Ocean Products division will also engage in development of enclosed wet submersibles and swimmer delivery vehicles for the military and for the recreational diving industry.



Before joining Perry, Cushman was with Oceaneering International in Houston, Texas, as project manager responsible for construction and installation of five 1000 foot saturation diving systems built for offshore drilling rigs. Prior to that assignment he was president and director of Oceaneering's diver training subsidiary, the Commercial Diving Center in Los Angeles. Cushman has been involved professionally in the diving industry since 1961, and is currently vice president of NAUI. 🐠

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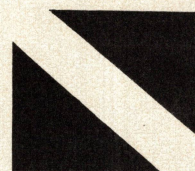
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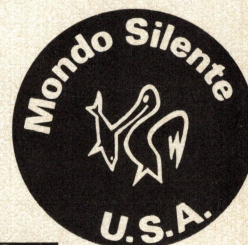
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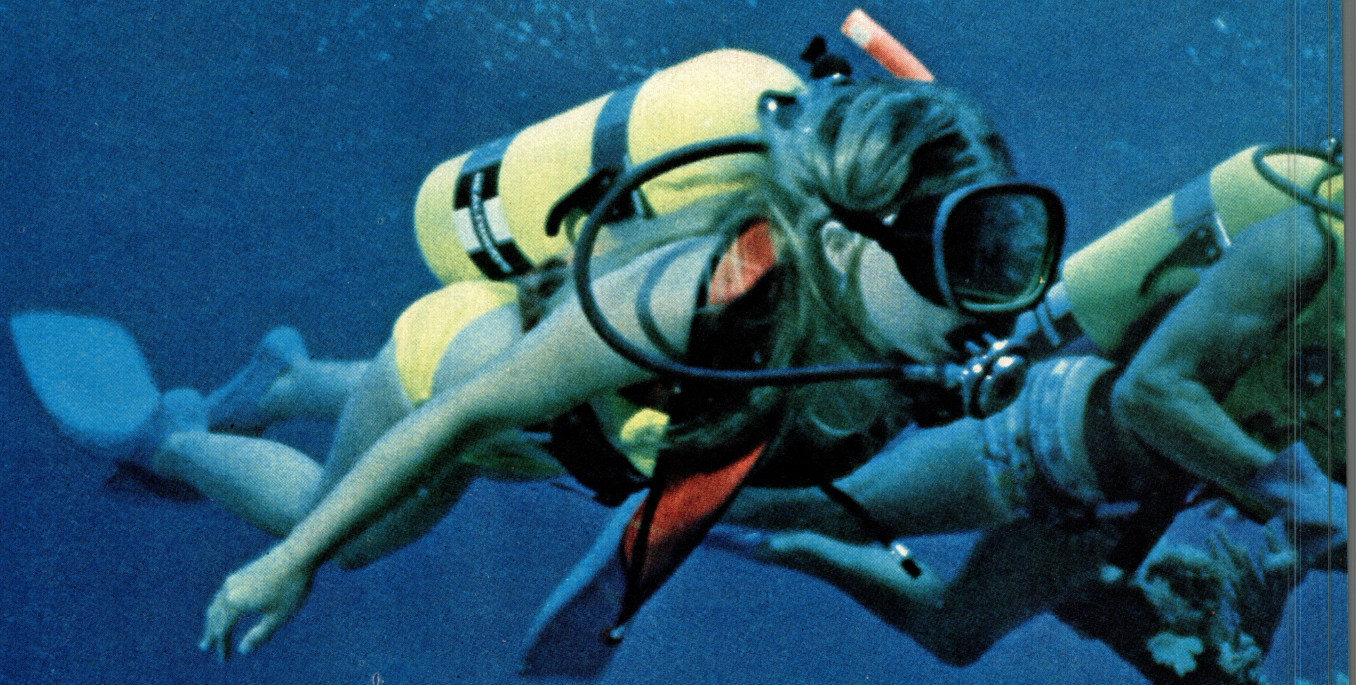
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The Rum Cay W



wreck

113 year old battleship offers best wreck diving in Bahamas

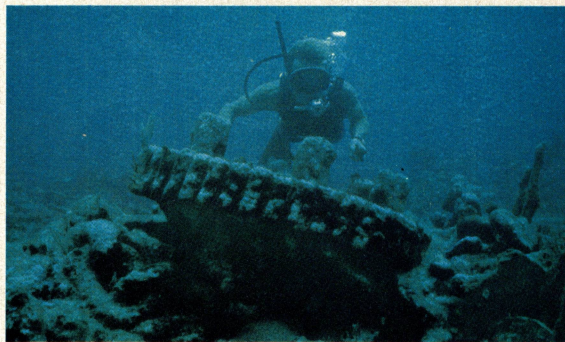
By Paul Tzimoulis

One of the finest wreck dives in the Bahamas is a nineteenth century British battleship sunk on a shallow coral reef off the obscure Bahamian island of Rum Cay. Situated in the southern Bahamas, some 200 miles from Nassau, this wreck remains intact and beautiful after 113 years of submersion. It's the kind of wreck that divers dream of — cannonballs, winches, cannon, anchors, bronze spikes, and all the rest of the "goodies" which help to make a wreck exciting. Add to this crystal clear water, magnificent coral formations and plenty of fish and you have the ingredients that make the Rum Cay wreck a winner.

I first heard about the Rum Cay wreck while I was in Nassau several years ago. Charlie Badeau and Gardner Young of Underwater Tours Ltd. indicated an old wreck loaded with cannons was reported to lie on the reef off this obscure island. Badeau is one of the foremost authorities on Bahamian maritime history, especially shipwrecks, and he subsequently produced a clipping from the Feb. 8, 1862 edition of *The Illustrated London News*. It showed an etching of a British line-of-battleship known as the *Conqueror*, and had a description of her sinking at Rum Cay.

Armed with this clipping and scanty historical report, I visited Stella Maris Inn the following year. Since Stella Maris was the closest jump-off point for Rum Cay, it was the obvious place to start my search. I related the story of the wreck to owner Jorg Friese and showed him the clipping. Jorg organized a search expedition within two days. We would fly over to Rum Cay and make a preliminary survey of the area by skiff.

Rum Cay is a small island 24 miles east of Stella Maris. It can be reached by boat in three to four hours, or by light plane in 15 minutes. We chose to fly over, using a privately owned Cessna. There



photography by Author



The *Conqueror* was a ship of unique design, built during the transition era from wooden sailing vessels to steam driven steel hulls. She was a wooden, three masted sailing vessel equipped with a steam engine powered single screw. At far left Jorge Friese guides guest Donna Cooksey over the jumbled beams of the wreck. From top, divers check out a double row of long bronze fastening pins which stick up from the hull's timbers, examine one of the ship's cannonballs, and ponder the identification of a large gear.



was just enough room for the barest dive gear and one tank of air per diver. Our landing strip was a crude coral runway but sufficient for our needs. Jorg quickly made contact with the local residents and borrowed the island's only truck to help haul our gear to the beach.

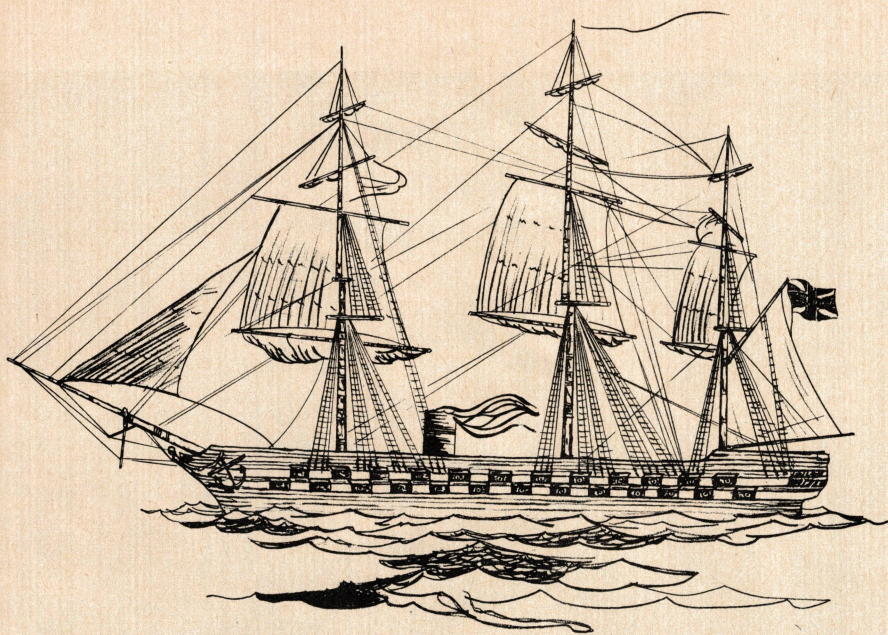
We went into town seeking more information about the old wreck. Port Nelson, the only settlement on Rum Cay, is a quiet little village of 75 people. They have one main street (paved) and one bar known as Lulu's. Jorg learned that one villager knew the location of the wreck. He was retired Constable Bains, 70 years old but still an alert, humorous man. Constable Bains said his father had taken him fishing over the wreck site many times and that he used to peer down into the clear water and see the cannons and other wreckage. Constable Bains agreed to lead us to the wreck site and we soon set out in two small aluminum skiffs.

The wreck site was lying on the outside of a large, submerged coral reef at the southeast end of the island, maybe one-fourth mile offshore. This was the windward side where great sea swells roll in from the Atlantic. By the time we had begun the search, it had become overcast and there was a light drizzly rain. Almost an hour passed and we had not seen a sign of any wreckage — just acres of antler coral. We were taking turns being towed behind one of the skiffs, while the other remained anchored as a reference marker. Suddenly Jorg gave a whoop as the ship came into view. We had found the *Conqueror*!

The wreckage lay in 30 to 40 feet of water, with parts of the ship strewn over almost an acre of sea bottom. At first glance it resembled Neptune's junk yard. Twisted strips of metal and odd shaped, unidentifiable lumps were jumbled in a haphazard fashion as though violently shaken apart by some gigantic monster. The fury and force of a storm driven sea had done its work well.

The *Conqueror* had remained submerged and untouched for more than 110 years . . . just enough time to create that look of classical shipwreck. Corals had encrusted much of the wreckage, but the parts still retained their familiar shapes. Pieces of the ship were buried under layers of loose sand, but these could be easily uncovered with a little fanning. Each time I have visited the *Conqueror* since, I have been charmed by her classic appearance.

The Conqueror's anchor chain winds its way along the ocean floor in the direction of the treacherous reef shallows.



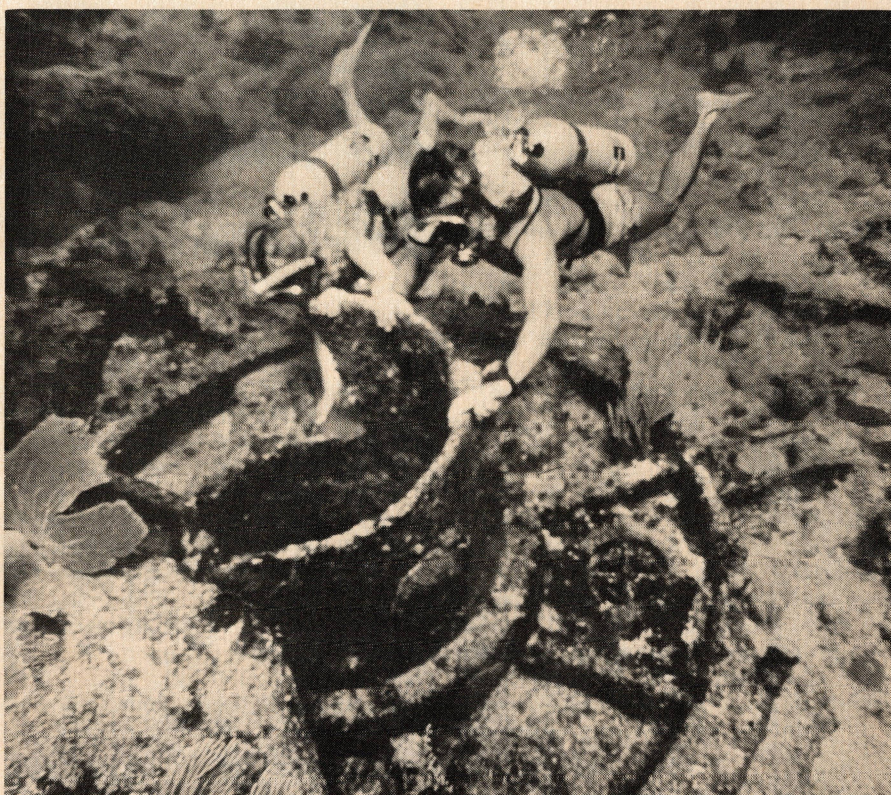
Sketch of the HMS Conqueror, under sail and steam as taken from an old engraving by Groom & Co., of Plymouth, England.

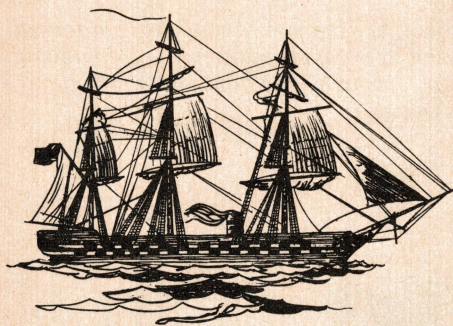
The most predominant feature of the wreck site is the drive shaft, connecting the ship's propeller to its enormous steam engine. It is 16 inches in diameter and stretches out along the ocean floor for 90 feet or more, like some misplaced oil pipeline. It is joined together in two places by massive couplings fastening the sections together. Various shaped pieces of iron beams, steel plates, and other debris are scattered about it.

At the forward end of the drive shaft, there is one huge gear which sits up high on a pile of rubble. This gear must weigh tons, for it is more than four feet in diameter and seven or eight inches thick. On the upper side of the gear are six studs which appear to lock into another piece of machinery. It is suspected that this giant gear once fitted onto the head end of the drive shaft, serving as part of a gear mechanism to the engine. Adjacent to the big gear is a pile of anchor chains which may have possibly been stored in a locker at the time of the sinking.

On the other side of the drive shaft, nestled in a depression below it, is a double row of long bronze pins sticking up out of the bottom. They are one and a half inches in diameter and perhaps twenty inches tall. No doubt these heavy metal fittings were used to pin together the ship's heavy timbers. Forward of the drive shaft there is a jumbled mass of heavy machinery, probably the major parts to the ship's steam engine and boiler. A little way beyond the engine is a large anchor, possibly the spare which was in storage at the time.

California diver Donna Cooksey helps Jorg Friese prepare for a dive on the Rum Cay wreck. Below, Donna and Jorg wonder about the identity and function of a curiously shaped metal structure believed to be part of Conqueror's smoke stack.





Among the smaller artifacts which can be found on the wreck are bronze spikes, copper sheathing nails, and other bits of bronze fastenings. And close to the anchor are great quantities of cannonballs, maybe 200 or more. It looks as though the entire sea floor is littered with them. The cannonballs are quite large — possibly 32 pounders. They are fused together and cemented to the ocean floor by encrusting coral.

Although the cannonballs are everywhere, it takes a good bit of careful searching to find a cannon. One is located some 30 feet forward of the anchor, practically buried in the sand. Only a small portion of the gun's muzzle and the top of the barrel are visible. No one is quite sure whether the rest of this ship's 101 guns remain buried under coral and sand, or were salvaged by the British shortly after the wreck. I suspect many are still on the reef.

Well beyond the spare anchor is a long length of anchor chain stretched across the coral bottom. This was probably the bow anchor and chain which was tossed out on the reef in a futile attempt to save the ship. From the main portion of the wreck, bits and parts of the ship are scattered for a hundred feet in every direction. The violent undersea turbulence of a century of winter storms has rolled things about considerably. The wreck is still in the grips of a furious sea, and will probably never come to rest until she is completely buried.

The history of this ship is almost as fascinating as the wreck itself. Although commonly referred to as the *Ocean Conqueror*, the correct name of this ship was the *HMS Conqueror*. She was one of the finest British line-of-battleships of her time. The *Conqueror* was a ship of unique design, built during the transition era from wooden sailing vessels to steam driven steel hulls. She was a three-masted, square rigged sailing vessel, but



Donna Cooksey surveys the jumbled mass of metal parts and tubing of the Rum Cay wreck. Looking much like "Neptune's junk yard," the wreck is littered with hundreds of cannonballs. The cannonballs shown at left are thought to be 32 pounders.

completely equipped with a steam engine powered single screw. Although her hull was wood, this crossbreed carried a good deal of modern steel machinery.

Built at the Devonport Dockyard, England, and launched on May 2, 1855, this fine fighting vessel was 240 feet long, had a 55 foot beam, and displaced 3225 tons. She bristled with 101 guns, most all of them 32 pounders. At the time of her ill fated voyage, the *Conqueror* was in a state of military alert and ready for battle. She carried a full complement of 1400 sailors, officers, and marines. In com-

pliance with the British Admiralty's orders, the *Conqueror* had shut down her steam engine to conserve her coal supply. She was navigating on sail only.

On December 29, 1861, the *HMS Conqueror* ran aground on a submerged coral reef of Rum Cay. A strong current had caused an error in navigation. She was stuck fast onto the reef with her keel broken in half and her sides caving in. All attempts to free the stranded ship failed. Everyone aboard the wrecked ship was able to get ashore safely. Most of the ship's provisions and personal gear were



The most predominant feature of the Conqueror wreck is the ship's drive shaft, which is 16 inches in diameter and stretches along the ocean floor for 90 feet or more. Above, Jorg Friese prepares to photograph a giant gear in an attempt to identify the part.

also salvaged due to an unusual spell of calm weather. Subsequent storms, which sent heavy breakers crashing against this reef, completely demolished the great battleship and sent her to the bottom. And it is there that she lies today, guarded by one lonely barracuda which hangs motionlessly over the wreck.

The *Conqueror* remains in a near virgin state, unmolested by salvagers. She carried no gold or silver so the ship is of no interest to treasure hunters, and she is too remote for commercial metal scrap-pers. Just about the only visitors who fre-

quent the *Conqueror* are groups of sport divers from Stella Maris dive resort.

Weather permitting, resort owner Jorg Friese schedules a weekly dive boat trip to Rum Cay aboard his 42 foot cabin cruiser *Wil-Mar*. The trip takes anywhere from two to four hours, depending on wind and currents. The boat generally departs early in the morning to insure a full day's diving. Each guest is allotted two tanks of air for the trip, and lunch is served between dives.

Visitors are allowed to salvage small artifacts and souvenirs from the wreck,

but any serious salvage operations are discouraged. Most dive guests are far more interested in photographing the wreck, as visibility ranges from 60 to 125 feet. The ship is very photogenic because of its unusual array of steam engine machinery. So, if you're looking for a good wreck dive in clear, warm water, try Rum Cay.

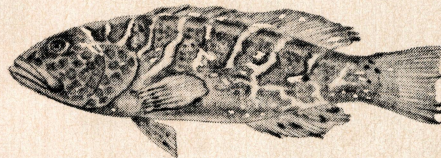
For more information about boat trips to Rum Cay and the current wreck dive schedule, write to: Jorg Friese, Director, Stella Maris Inn, Box 105, Stella Maris Post Office, Long Island, Bahamas. 🐠

The Tiger Grouper

(*Mycteroperca tigris*)

Groupers may qualify as the favorite fish of divers. They are friendly if the diver chooses to be friendly, and will sit still for a pat on the head if they can get a handout. On the other side of the coin, groupers are a highly desirable, high quality food fish commonly sought by spearfishermen around the world. They are known to give a good chase, hiding in holes or caves when threatened, and dashing for it when things seem safer. □ The tiger groupers are so-called because of the pale diagonal bars on the back that are reminiscent of the great Asiatic cat. There are 11 of these bars, but usually not all of them show up, with only eight or nine being distinctive. On large individuals the lines are marbled on the lower half of the fish, and the lines on the vertical fins (dorsal, caudal and anal) are also marbled, as they are on our pictured specimen.

The total color pattern of this fish separates it from all other Bahamian groupers; the head, body and vertical and ventral fins are brown, with all pale markings a bluish white. The pectoral fin is yellow to orange. □ Juvenile tiger groupers are bright yellow with a black band that extends along the length of the body. But even with this different coloration the pale tiger bars can still be seen. The tiger grouper is known to switch sexes as it matures — females becoming males in later life. The fish grows to 30 inches in length. When they reach about 11½ inches, they begin to exhibit the adult features such as the marblings. Also distinctly characteristic of



large adults are the "tags," or irregular extensions of fin rays on the tail, dorsal and anal fins. Because of this feature, Beebe and Tee-Van labeled the fish "Rag-tailed Rockfish" during their ichthyological expeditions in the early 1930s. Groupers were then called rockfish, as were the hinds, jewfish, and sea basses, because they all live in the rocks. Groupers are really not rockfish, but belong to the huge Serranidae (bass) family and are divided into genera. As Bohlke and Chaplin explain it, the *Mycteroperca* genus is distinguished by a serrated lobe at the angle of the preopercle (forepart of the gill cover). Above the lobe is a slight notch. Within the *Mycteroperca* genus, *M. tigris* is distinct because one nostril is much larger than the other. In the other *Mycteroperca*, the two nostrils are nearly equal in size.

□ Most groupers tend to stay near the bottom and the larger specimens are especially sedentary. However, the tiger grouper will take a lure that is trolled near the surface. The fish is carnivorous and its diet includes fish, crustaceans and shrimp. Its large mouth and strong canine teeth are especially suited for the job of crunching through hard shells. The tiger grouper is often found in relatively shallow depths (25 to 50 feet) near rocks and reefs around Bermuda, the Bahamas, off Florida to the northern coast of Brazil, including the southern Gulf of Mexico. It's a fairly common fish where found and is not difficult to photograph if the diver is friendly and willing to offer a piece of meat as sitting fee. ➤

Photo By Carl Roessler - Text By Hillary Hauser

Photo taken in 50 feet of water off Roatan, Republic of Honduras. Roessler used a Nikon F camera with a 55mm lens, a Bauer strobe, Kodachrome II film, 1/60 sec. at f/8, 24 inches from subject.

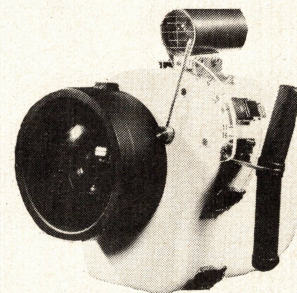


Aqua Motion has introduced Sea Dart, a new interspace propulsion device designed for the sport diver to add "down time" and lessen fatigue, while increasing the diver's freedom and mobility. The Sea Dart is made of high impact plastic and has a running time of approximately 60 minutes. It has a maximum depth rating of 100 feet. Priced at \$199.95. Contact: Aqua Motion, 7914 Ronson Rd., San Diego, California 92111.

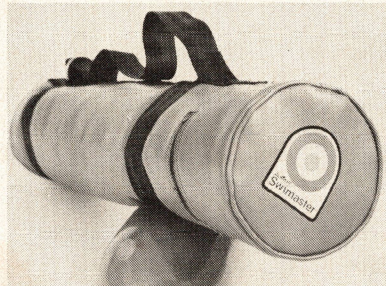


New Gear

Image Devices Inc. has a new Model ACL-4 underwater housing for the Eclair ACL camera with 400 foot (or 200 foot) magazines which is cast aluminum and tested to 350 feet deep. The housing weighs 39 lbs. topside or 16 ozs. negative buoyancy at average working depth underwater. Retail price is \$3995. An enlarged reflex viewing system is available. Contact: Image Devices Inc., 811 N.W. 111 St., Miami, Fla. 33168.

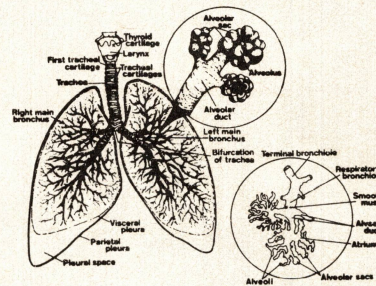


AMF Swimaster's new tank and regulator tote bag is made of high-strength expanded vinyl with special water resistant backing for long life. The bag protects tanks and keeps them from damaging pools, boats, etc. An upper compartment at the top is designed for regulator storage, and the bag comes with a convenient shoulder strap. \$15.95. Contact: AMF Swimaster, 3801 South Harbor Blvd., Santa Ana, California 92704.

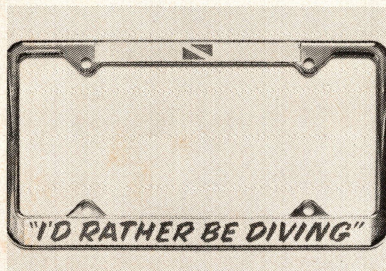


Marine Environmental Supply makes beautiful saltwater aquariums for research institutions, schools or amateur fish enthusiasts. Standard sizes are 50, 70 or 100 gallon water capacity, but custom aquariums are available in almost any size or design. All aquariums come with convection cooling, sub-sand filtration and convenient controls. Contact: Marine Environmental Supply, Box 97, Mountlake Terrace, Wa. 98043.

Human Anatomy and Physiology for Skin and Scuba Diving Instruction is the name of a set of 37 slides from Saturn Scientific, developers of visual teaching aids. The two by two inch color slides are divided into three groups, the cardiovascular, respiratory and nervous systems, and includes photographs, diagrams and selected photomicrographs. Price per set is \$37. Contact: Saturn Scientific, Box 2417, Ft. Lauderdale, Fl. 33303.



"I'D RATHER BE DIVING." Now divers can identify themselves and their sport just as skiers, pilots and others do, with this new car license plate frame. Finished in the red on white colors of diving, the frame features a diver's flag. Made of durable metal with chrome finish, it will fit any car. Retail price is \$3.49 each or \$6.49 per pair, including shipping. Contact: Shuttleworth, Dept. NG774, Box 231, West Covina, Ca. 91790.

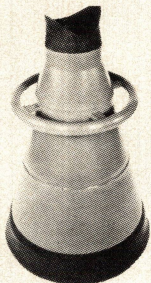


Oceanic Products has an aluminum Arriflex/Marine housing for 16mm U/W film making. The Arriflex camera has been modified to use 400 foot co-axial daylight loading film, and the viewfinder has been redesigned to provide the diver with enlarged, through the lens viewing. It has a corrected front port, full controls and comes with an internal light. Contact: Oceanic Products, 814 Castro St., San Leandro, Cal. 94577.

National Divers Mfg. makes a 15 foot long all-fiberglass paddle board which weighs only 40 pounds. It has two sealed air chambers with drain plugs: one six foot compartment will hold two tanks and other gear. Hand grips on either side make it easy to carry, and it has anchor hooks front and rear. The board can be paddled kneeling or lying down. \$260. Contact: National Divers Mfg., 217 W. Julian, San Jose, California 95110.

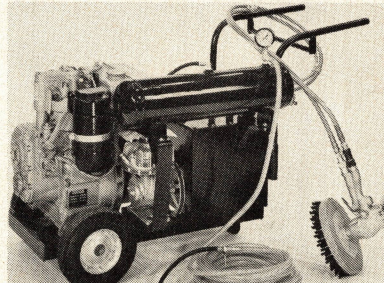


The Batiscopio, an Italian water glass distributed in the U.S. by Richards "Aqua-Lung" Center, is designed to be used from a boat to help divers find fish, treasure, and to improve marine safety. It is a lightweight unit measuring 23 inches high and 13 inches wide when assembled, but can be disassembled for easy carrying. \$29.95. Contact: Richards "Aqua Lung" Center, 233 West 42 St., New York, N.Y. 10036.

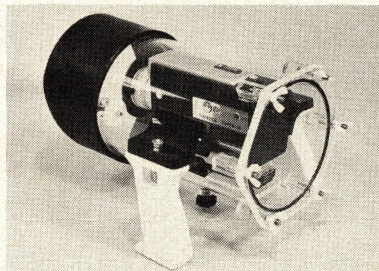
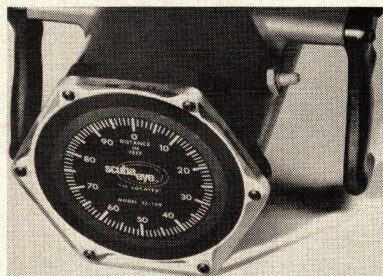


The Sea Rover wet suit from U.S. Divers is made with textured exterior rubber with a blue nylon lining. It comes complete with Velcro fastened Farmer John bib-style pants, and the slip-over jacket features an inverted zipper and high turtleneck collar. Thickness is quarter inch; and available in five sizes: XS, S, M, L and XL. Retail price is \$97. Contact: U.S. Divers Co., 3323 West Warner Ave., Santa Ana, Ca. 92702.

Now the Marine Division of Custom Hydraulics offers the working diver a lightweight, compact and fully portable hydraulic power pack as well as a complete line of hydraulic tools to suit any hull cleaning job. This proven power pack, available with or without a built-in breathing air system, is made with either gasoline, electric or diesel power. Priced from \$1,969. Contact: Custom Hydraulics, 6819 S.W. 81 Terrace, Miami, Fla.

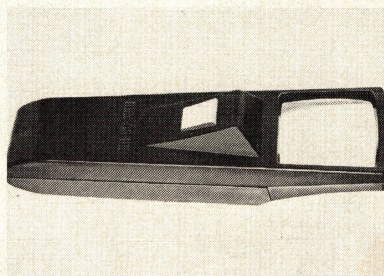


The Scuba-Eye, a rugged solid-state sonar unit developed specifically for the scuba diver, opens a whole new world of exploration. Easy to read dial can give immediate readings on how far you are from the bottom and from the surface, as well as spotting reefs, large fish, sunken hulls or any other solid objects for you. Price is \$349.50 complete with batteries. Contact: Fishmaster Products, Box 9635, Tulsa, Okla. 74107.

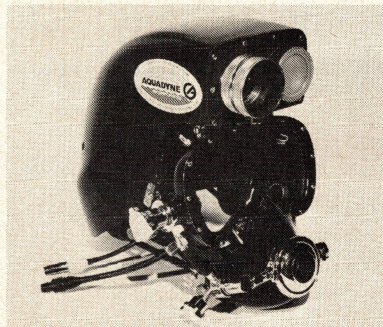


The east meets the west in an American underwater housing for the Yashica Super 40/Super 50N super-8 movie camera. The case includes shutter and focus controls and is guaranteed to 300 feet. The camera is secured in the case by means of a stainless steel tie-down bolt that screws into the tripod attaching hole. The black plastic shield cuts out unwanted light. \$73. Contact: Ryan Products, Box 6506, Columbus, Ga.

Magna-Lite is an amazing magnifying flashlight that many divers use for checking for cracks in high pressure hoses, or looking for faults in their O rings. It features a 3.5 optical quality magnifying lens and No. 222 magnifying bulb. Complete with two easily replaced AAA penlite batteries. It weighs only one and a half ounces, with batteries. Price is \$3.95. Contact: Epoch Trading Co., 16661 Ventura Blvd., Encino, Ca.

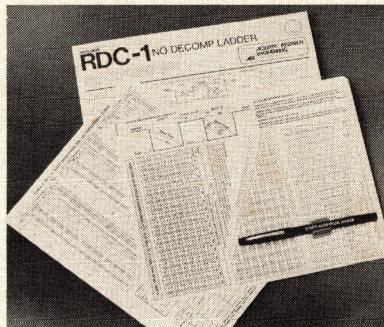


The Observer II U/W television system maximizes the efficiency of any commercial diving operation. Developed by General Aquadyne, the unit permits the diver complete freedom of action. The TV camera weighs less than one and a half pounds, and has an 8.5mm lens. The surface console has a video monitor, video tape recorder and power supply. Contact: General Aquadyne Inc., 333 E. Haley St., Santa Barbara, California 93101.



Scuba Spec is a new aid for U/W visual correction which can be used with almost any diving mask. It consists of two corrosion free parts: the frame front, which contains a pair of lenses ground to the diver's prescription, and an anchor bar. When the anchor bar is glued in place on the inside of the mask, the lenses hang suspended to help alleviate distortion. Contact: Underwater Spectacle, Box 3358, Savannah, Ga. 31403.

The RDC-1 No Decomp Ladder presents Tables 1-10 through 1-13, an easy to use dive ladder, an audio-visual marker to compute repetitive dives, equipment checklist, dive log, and doubles as a slate with Aquatic Recreational Enterprises new underwater pencil. The RDC-1 is printed on eight by ten inch plastic which will not fade or break. \$6.95. Contact: Aquatic Research Engineering, Box 71, Pitman, New Jersey 08071.





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Bahamas. Playground of the western world.

"You don't have to be the world's greatest photographer to win this contest," said Gordon Lomer, sports editor of the Bahamas Tourist News Bureau. "There will be a certain element of luck in finding the subjects on the list of 32 marine life specimens to be recorded on film." The underwater scavenger hunt-like contest he's referring to is the First Bahamas Underwater Photographic Treasure Hunt, to be held November 10 to 16 of this year.

photograph by Jack McKenney

The initial part of the contest will last three days, with the divers taking the regular scheduled dive trips at the Outer Islands resorts. The resorts include Small Hope Bay Lodge and Andros Beach Hotel on Andros, Stella Maris Inn on Long Island, Romora Bay Club at Harbour Island, Spanish Isles Resort at Spanish Wells, the Current Club on Eleuthera, and the Underwater Explorers Society at Freeport. Underwater Tours will host the playoff in Nassau. For more information contact: Bahamas Tourist Office, 200 Southeast First Street, Miami, Florida 33131. 



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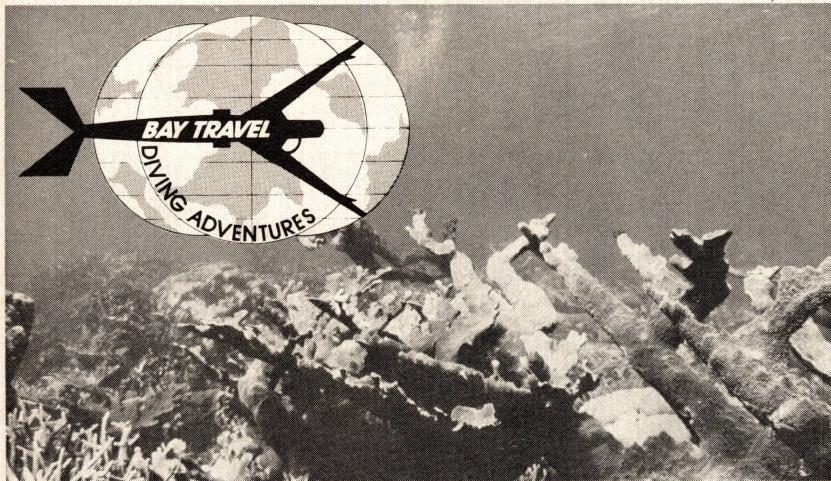
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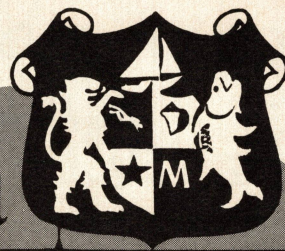
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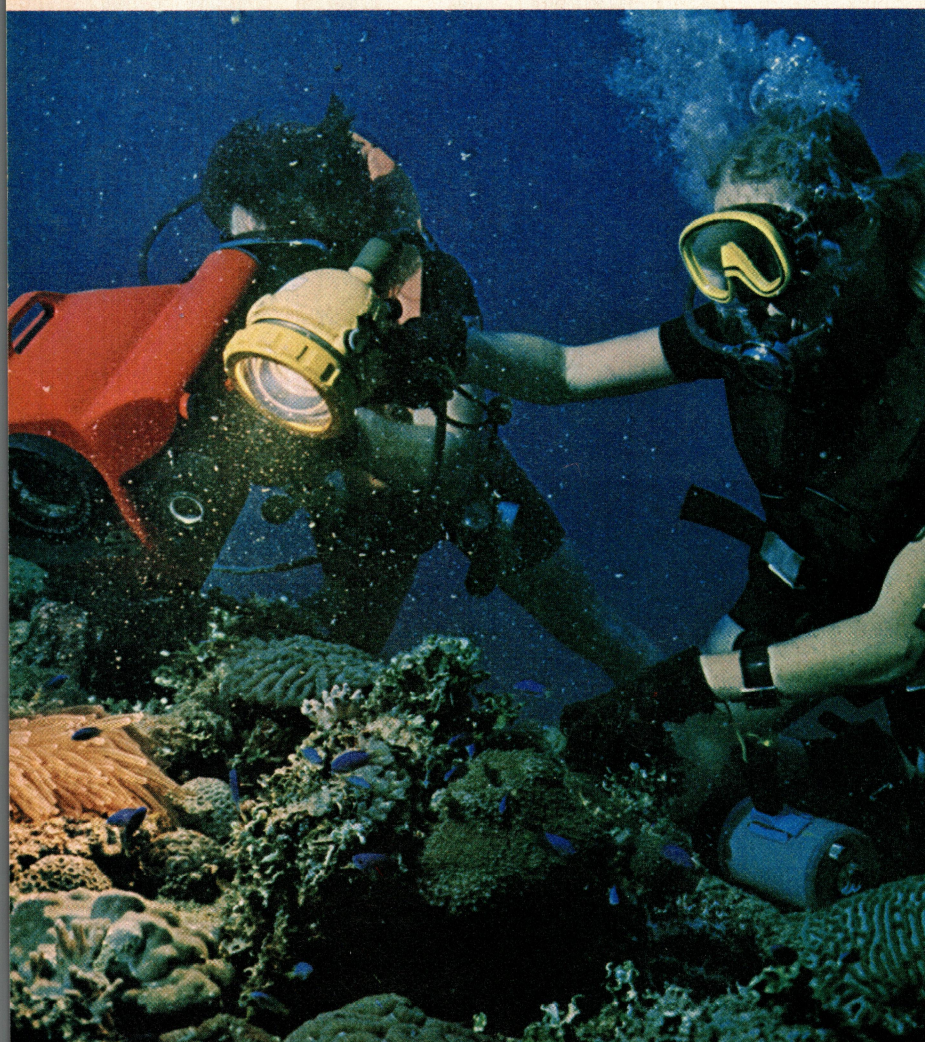


Dive Tour News



- Oct. 4 — MARISLA/SEA OF CORTEZ — 7 days, Photomarine Int'l Travel, Reseda, Calif.
 Oct. 4, 11, 18, 25 — BONAIRE — 8 days, Lisind International, New York, N.Y.
 Oct. 4 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.
 Oct. 5 — GRENADINES — 7 days, Windward Leeward Sailing Tours, San Francisco, Calif.
 Oct. 5 — HONDURAS — 7 days, USAFECO Salt Lake City, Utah
 Oct. 7 — BIMINI — 7 days, Capt. Skeet LaChance, Adventure Cruises, Ft. Lauderdale, Fla.
 Oct. 11 — COZUMEL/AKUMAL — 8 days, Sunland Int'l Tours, Beverly Hills, Calif.
 Oct. 12 — SPANISH HONDURAS — 6 days, Grand Am Int'l Tours, Ocala, Fla.
 Oct. 12 — COZUMEL/YUCATAN — 8 days, Van Worley, See & Sea Travel, San Francisco, Calif.
 Oct. 12 — BONAIRE/CURACAO — 9 days, See & Sea Travel, San Francisco, Calif.
 Oct. 12 — ROATAN/HONDURAS — 6 days, Chalet Club, New York, N.Y.
 Oct. 12 — GRENADINES — 7 days, Windward Leeward Sailing Tours, San Francisco, Calif.
 Oct. 12 — HONDURAS — 7 days, Underwater Schools of America, Fountain Valley, Ca.
 Oct. 18 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.

- Oct. 19 — CAYMAN ISLANDS — 8 days, Rich Bergero, See & Sea Travel, San Francisco.
 Oct. 19 — XELHA/AKUMAL — 9 days, Ruth Fry, World Diving Expeditions, Norristown, Pa.
 Oct. 22 — AUSTRALIA/CORAL SEA — 17 days, Bob Hollis, See & Sea Travel, San Francisco.
 Oct. 22 — TRUK/PONAPE — 11 days, Innerspace Adventures, Hickam, Hawaii.
 Oct. 26 — AFRICA/INDIAN OCEAN — 23 days, See & Sea Travel, San Francisco, Calif.
 Oct. 26 — HONDURAS — 7 days, Houston Scuba Academy-West, Houston, Texas
 Oct. 27 — TAHITI/RANGIROA — 9 days, Photomarine Int'l Travel, Reseda, Calif.
 Oct. 30 — ANTIGUA — 7 days, Chalet Club, New York, New York.
 Nov. 1 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.
 Nov. 1 — ISRAEL/RED SEA — 21 days, Lee Turcotte, Atlantis Safaris, Miami Shores, Fla.
 Nov. 1, 8, 15, 22, 29 — BONAIRE — 8 days, Lisind International, New York, N.Y.
 Nov. 2 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, Calif.
 Nov. 9 — ROATAN/HONDURAS — 7 days, Kathy Taylor, Island Reef Safaris, Wilton, Conn.
 Nov. 9 — HONDURAS (ROATAN) — 7 days, Chalet Club, New York, N.Y.
 Nov. 10 — SPANISH HONDURAS — 4 days, Grand Am Int'l Tours, Ocala, Fla.
 Nov. 11 — HAWAII/KONA — 8 days, See & Sea Travel, San Francisco, Calif.
 Nov. 11 — BONAIRE — 7 days, Chalet Club, New York, N.Y.
 Nov. 13 — MICRONESIA — 17 days, Chalet Club, New York, N.Y.
 Nov. 13 — TRUK LAGOON — 14 days, Chalet Club, New York, N.Y.
 Nov. 16 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.
 Nov. 22 — COZUMEL/AKUMAL — 8 days, Chalet Club, New York, N.Y.
 Nov. 22 — COZUMEL/AKUMAL — 8 days, Sunland Int'l Tours, Beverly Hills, Calif.
 Nov. 22 — AUSTRALIA — 17 days, Chalet Club, New York, New York.
 Nov. 23 — COZUMEL/YUCATAN — 8 days, Ron Merker, See & Sea Travel, San Francisco, Calif.
 Nov. 23 — CHUNYAXCHE/YUCATAN — 9 days, Ruth Fry, World Diving, Norristown, Pa.
 Nov. 27 — HAWAII/KONA — 8 days, Photomarine Int'l Travel, Reseda, Calif.
 Nov. 29 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.
 Nov. 30 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, Calif.
 Nov. 30 — AUSTRALIA — 17 days, Chalet Club, New York, New York
 Dec. 6, 13, 20, 27 — BONAIRE — 8 days, Lisind International, New York, N.Y.
 Dec. 10 — AQABA — 10 days, Chalet Club, New York, New York.
 Dec. 14 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.
 Dec. 21 — COZUMEL/YUCATAN — 12 days, See & Sea, San Francisco.
 Dec. 21 — CAYMAN ISLANDS — 13 days, See & Sea Travel, San Francisco.
 Dec. 23 — SOUTH CAICOS ISLANDS — 7 days, Chalet Club, New York, N.Y.
 Dec. 25 — ANTIGUA — 7 days, Chalet Club, New York, New York
 Dec. 28 — BAHAMAS — 7 days, Capt. Chalker, Tropic Diving Cruises, Ft. Lauderdale, Fla.
 Jan. 4 — AUSTRALIA — 17 days, Chalet Club, New York, N.Y.



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U/W 16mm MOVIE COURSE

The Kona Diving Lodge at Kona, Hawaii, will host an underwater 16mm cinematography course during the first two weeks of November this year. The course will be taught by Van Buskirk, secretary of the Underwater Society of America, and well known lecturer and underwater cinematographer. Course material will cover U/W 16mm movie equipment, film, composition and direction, developing, editing and much more. As part of the course a full length 16mm movie will be produced that will be suitable for film festival, television and educational release.

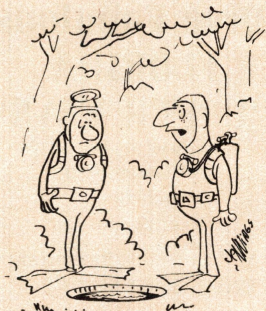
Tuition for the course includes accommodations at the Kona Diving Lodge (room and board), airport transfers, tanks, weight belts and air, all diving from boats, instruction, use of 16mm underwater movie equipment, film, processing, and title credits. Students should bring their own personal diving gear.

For more information contact: Kona Diving Lodge, P.O. Box 3005, Kailua-Kona, Hawaii 96740.

MONTEGO REEF DIVERS

Montego Reef Divers, of Montego Bay, Jamaica, is now under the management of Richard T. Davies, formerly of General Oceanographics. Under Davies, Montego Reef Divers has installed a new Worthington SAB 20 compressor, bringing up their output to 32 cfm, and a new work bench for tank inspection and repair, and outboard maintenance. They have also acquired the tools, spare parts and know-how for regulator repair in their shop. In addition, Montego Reef Divers has dealerships for both U.S. Divers and White Stag, and so can ensure new equipment for rentals.

Along with the physical improvements the company has developed an above water portion of the diving day that includes ecology courses, slide shows and seminars conducted by guest speakers from the Discovery Bay Marine Laboratory on Jamaica. They have found that divers thoroughly enjoy this academic dimension of their diving. For more information contact: Montego Reef Divers Ltd., Chalet Caribe, P.O. Box 356, Montego Bay, Jamaica, West Indies.



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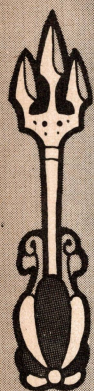
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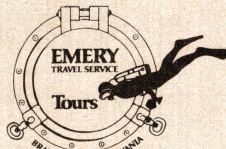
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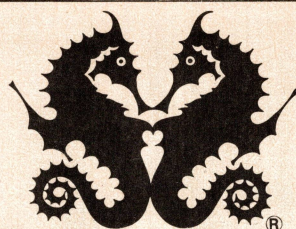
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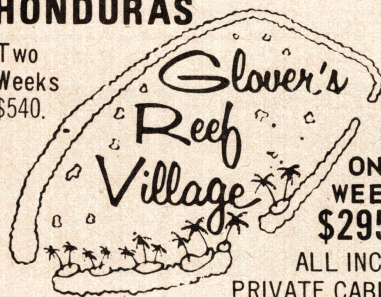
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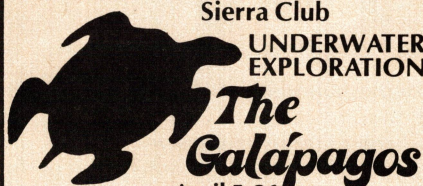
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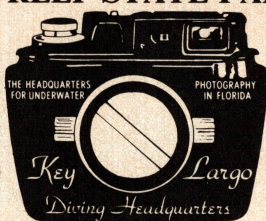
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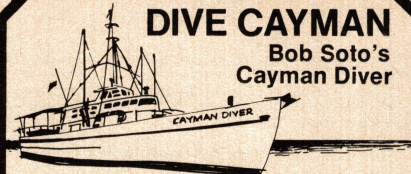
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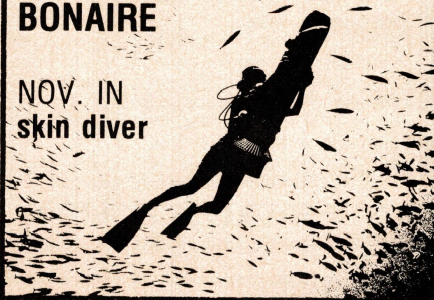
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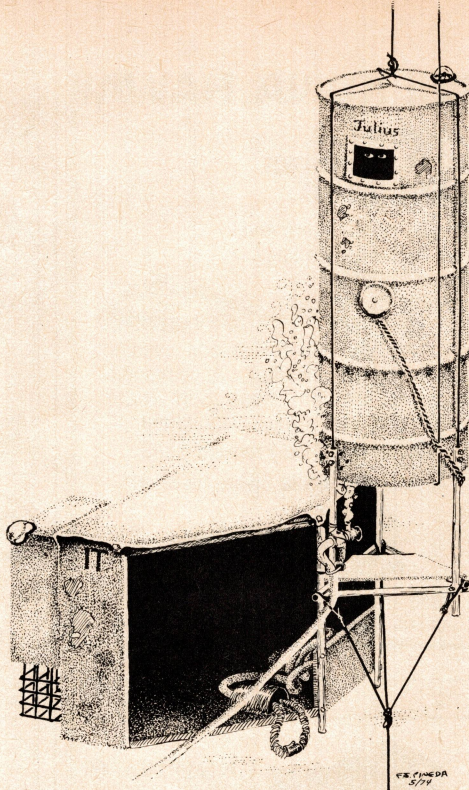


Illustration by Fernando Pineda

By David Schloerb

EDITOR'S NOTE: Although living underwater is a very sophisticated aspect of diving and is not something to be taken lightly, upon receiving David Schloerb's manuscript, we could not resist publishing it. The imagination and ingenuity of this 17 year old boy is equaled only by his ability to clearly record on paper, in a concise and easy-to-read style, the results of his project. We think you'll enjoy sharing his fine adventure with him. However, SKIN DIVER cautions other youngsters about attempting similar projects due to the potentially dangerous nature of living underwater for extended periods of time.

I turned to my mother on the porch and tried to think of something light to say. I didn't want her to worry so much. A few words passed between us. She said, "Be careful." I said, "I will." I left the porch and headed down to the lake in my swimsuit and tee shirt.

Brian Kittle, my best friend and diving buddy, was waiting for me by our tent. It was still light, the end of a warm August day. Like so many other days, getting into the water, going diving was just routine. I moved the same way, did the same things, but this dive was different. I had dreamed of living underwater since I was ten years old and now, seven years later, in a very limited sense, I was about to do just that. I waded out by the pier in front of my grandmother's cottage, fitted my mask, slipped on my fins, and submerged.

I swam out, slowly, along the hose, listening to the air which forced through it with the sound of the pump on shore. The lake bottom changed as I moved deeper, until at 12 feet, the last weeds gave way to an endless stretch of mud and silt. Twenty-five feet down and a

couple hundred feet from shore my destination came into view.

Larger, more expensive versions are called underwater habitats; places for men to eat and sleep under the sea. The Navy's Sealab and Cousteau's Conshelf projects are examples. It is only in a very loose sense that I compare my project with these; saturation diving is not for sport divers. Also, if one considers that the most expensive piece of equipment in my project was the \$60 hooka compressor, the difference is apparent.

The proper name of my habitat — I prefer the word house — was Julius. Julius was four and a half feet high and two feet in diameter. It was made from oil drums, pieces of pipe, plastic, scrap wood, and a number of obscure things I had collected over the past few years. The air inside Julius gave it a buoyancy on the order of a thousand pounds. This was compensated for by a few tons of rock in a bin, left from a previous project, which had long since disappeared into the mucky lake bottom, leaving only the cables, to which the house was attached, visible. Bolted on the side of Julius was a small flooded storage room which served as an equipment storage area. We named this room "It," unable to think of a more appropriate name.

As I approached the house I could see a number of small bluegills hovering about Julius and It. The hose I was following now slanted up to the house which was suspended five feet above the bottom. A constant flow of air came from underneath Julius as the air inside was replaced. Everything looked good.

I removed my tank and stored it in the appropriate place in It. Still breathing from the tank I placed my flippers in their cubby hole and then closed the valve on the tank. I moved somewhat like an as-

tronaut making a space walk. Being careful not to entangle myself in any loose cables or hoses, I pulled my way around the house and slipped underneath Julius. Then I pulled myself onto the step below its entrance and sat up with my head in the wiggling mass of air above. My ears came alive with the sound of air bubbling from the hose, such a contrast to the peaceful quiet normally found underwater. I placed my weight belt in its special box and hung my mask under the seat inside Julius. After attaching the leads to a lantern battery which hung under the seat, and which supplied electrical power, I stood up and pulled myself onto the seat. If everything worked right this would be my home for the next 24 hours. It was now a little after 7 pm.

Lifting the earpiece, part of an old house phone which served as our intercom, I pressed the 'call' button. I was immediately rewarded with a loud buzz which indicated that its twin was ringing in the tent on shore. After a moment the earpiece squawked, "Hello." I shouted, "'B', I'm here. Everything looks good." Brian responded with, "I think you have the wrong number," and hung up. I called back and we talked for a while but it became too hard to keep up the shouting. I signed off and turned my attention to my surroundings.

I checked the lights. Everything was working fine. I looked out the window and noted it was getting dark. A boat zoomed by over head; probably someone getting in his last ski ride of the day. A small bluegill drifted by my window and hovered there for a few minutes. He maintained his position and attitude with an ease I envied as a scuba diver. Then, as if he had been observing me and found nothing of interest, he drifted away.

Around 8 pm I called Brian. He said he was about to bring down some dinner. A few minutes later Brian floated past my window and popped his head through the open bottom of Julius. He handed me a jar with milk in it and a plastic bag which contained a couple pieces of chicken. At first the jar wouldn't open because of the pressure. Fortunately its seal was not perfect and after a couple of minutes enough air had leaked in so that it could be opened. Brian and I talked awhile. It was nice not having to shout. Then he went outside to give me a little show. He floated by upside down, or sideways, and peeked around the edge of the window making faces. He wasn't wearing a tank, so every now and then I heard a splash as he ducked his head in for a breath of air. Finally he waved good-bye and drifted upward, giving Julius a little push as he went.

As I finished my dinner it became too dark to see, so I turned on the interior light. Then I tried the outside spotlight. The first thing I noticed was a number of bubbles rising past the window. A clamp holding the hose had slipped so that most of the air, from the surface, was pumped

outside rather than inside the house. I remedied this by pushing the hose back into place with my foot. Then I flipped off the interior light to get a view outside.

Looking out the window reminded me of Cousteau's second Conshelf project during which his group had done a similar thing. The only difference was that his group was sitting in their living room, looking into the Red Sea, while I was sitting in an oil drum looking into a muddy lake. I had to wipe the window with a rag every few minutes because of the moisture. Everything inside was wet.

About 8:45 pm I called Brian to tell him I was going outside and that he should come down and join me. I slipped off my seat onto the step and turned off the interior light. The water seemed very cold as I fitted my mask. I put on my weight belt, then maneuvered myself to reach the Hooka attached just outside. I use the term "Hooka" to suggest surface supplied diving apparatus. The device itself was of the simple free flow type which consisted of a number of pipe fittings in a plastic case strapped to my chest, and two flexible rubber hoses coming out of the case and connecting to a mouthpiece. I worked my arms through its straps and turned a valve which diverted the air from Julius to the Hooka. When it started bubbling I inserted the mouthpiece and tried a few breaths. Satisfied that it worked, I eased outside and pulled myself around into it to don my flippers.

Suddenly a light shined in my eyes — Brian had arrived. He turned it on himself so I could see him, and it was nice having someone around again. Having to spend most of my time down there alone was not something I enjoyed. We swam around looking at the house and at each other. After about 40 minutes I started getting pretty cold and signaled I was going back inside. Brian waited for me to get in, helping with my equipment, then waved through the window and floated away.

Inside I decided to write a letter to my high school counselor. I opened the small storage compartment in my control panel. The door of the compartment served as my table. Taking out some almost dry paper and a pen, I began to write the sort of letter I had always dreamed of, starting with, "You'll never guess where I am!" Halfway through the letter, I turned off the interior light to watch some minnows dancing in the outside spotlight. By 10 pm I had finished the letter and decided to rest by leaning forward against the opposite wall of the drum. This didn't involve leaning at any great angle. The drum was so small that Brian, who is four inches taller than I am, could just barely squeeze inside.

Slowly I became aware that something was wrong. The hose clamp had slipped again. I could not work it back with my foot so I grabbed a pair of pliers from the storage compartment and climbed down

to fix it. Then I donned my mask and Hooka to try to work on it outside.

When I had done the best I could, I floated up for a look in the window. I had started to shake from the cold and now I began to vomit into the mouthpiece of the Hooka. (Several months later, I discovered that the pump was operating at approximately the resonant frequency of my stomach.) I told myself, "Take it easy Dave, keep control." I was able to pull myself back onto the step but, as I removed my equipment, my numbed hands couldn't hold everything and I dropped the pliers. Reaching for the pliers, I dropped my mask.

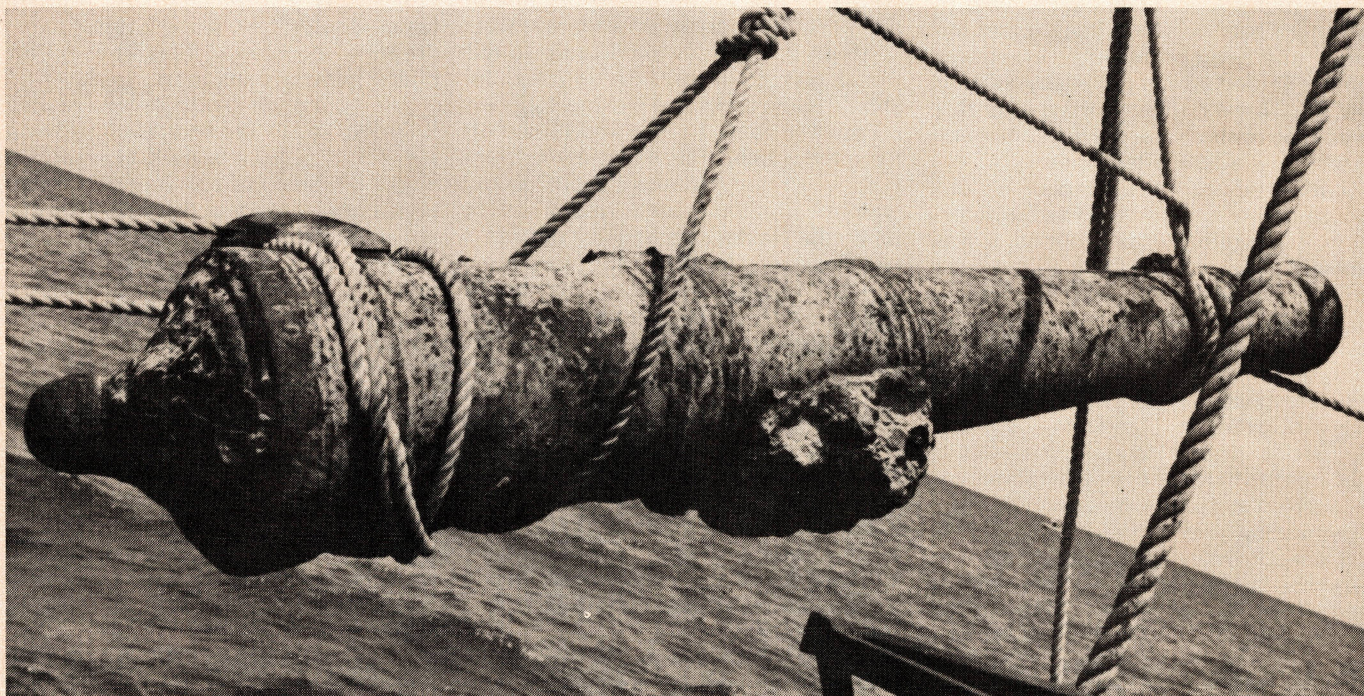
After climbing back inside I called Brian. He had to turn off the pump to hear me. I told him to bring down another mask. I'm still not too sure what happened next. On shore the pump is just a noise in the tent, and perhaps Brian started getting ready to come down and just forgot to turn the pump back on. Whatever happened, I suddenly realized I wasn't getting any air! I shouted and buzzed until my little brother John picked up the phone. I yelled, "John! Turn on the pump!" John went to get Brian and I think I heard my mother's voice, "What is it John? Brian's busy." I was preparing to leave when the hose started to gurgle again.

By 10:30 pm Brian had come and gone. He had found the mask I lost, and I had made my point about the importance of that noise in the tent. He told me that my parents wanted me to come up. I agreed it was a good idea: I was getting cold and too many things were going wrong, but I decided to wait until eleven o'clock. The interior light had gone out, so I sat watching the minnows outside my window. Brian sent some music down from a tape recorded on shore via the intercom. I could just hear it over the constant gurgle of the hose. A little after 11 pm I told Brian to come get me.

Five minutes later, Brian's face appeared in the window. On his head was a green army cap with a large capital 'B' sewn on the front. He handed in my cap, the one with the capital 'D,' and we looked at each other through the window. It's hard to explain the meaning of the 79¢ hats with the homemade emblems. They made us laugh at a project, with all its long hours of planning and building, which was too much of a failure to be considered a success. It was just a simple joke — one of those things which makes us human and gives hope for the future. I turned off the remaining lights and climbed down onto the step.

We ascended in darkness and surfaced into another world. The area was illuminated by a floodlight on shore and a yellow light hanging in the tent. I could hear my parents, who stood on the pier, talking in the still night air. I waved to them to show I was all right. Then Brian and I swam slowly to shore, on our backs, looking at the stars. 

Clues from poem unravel *The Mystery Of The Valiant Vessel*



photograph by Mike Cassaday

By Robert Weller

On those of a stoney reef she stumbled impelled, and almost hit a reef, and in her death throes our tormented ship was caught by that great iron ring, which chain of strong flint was seriously shaken, until the side was dented with rage, and such fury that the valiant keel broke.

This poem, written in prose style 240 years ago by Don Jose Ignacio de Toca Velasco, and printed in Madrid in 1734 under the title "Treacle Producida de un Venoma," describes the sailing of the Spanish treasure fleet from Havana on July 13, 1733, and the destruction of the fleet two days later as a hurricane drove the frail ships onto the Florida reefs. Jose Velasco was a passenger, and one of the few survivors, aboard the Spanish treasure nao *Nuestra Senora de las Angustias*.

In July, 1733, the Spanish treasure fleet of 21 ships set sail with their final destination the home port of Cadiz, Spain. In their holds they carried 20,000,000 pesos of silver, the results of several years of mining, minting and coining in New Spain. The sailing had been delayed for nearly two months due to ship repairs, provisioning, and parties in the emerald of the Caribbean, Havana. The fleet finally weighed anchor on a southeasterly breeze and sailed for the Bahama Channel.

Of the 21 ships in the *Tierra Firme* fleet, two of the smaller naos joined the fleet in Havana for protection along the coast as far as St. Augustine, Florida. The remainder of the fleet, with favorable trade winds, hoped to reach Cadiz, Spain, within six weeks. The four large galleons, herding their covey of high masted naos, reached the Gulf Stream behind schedule and well into the dangerous hurricane season.

Unknown to the general of the fleet, Rodrigo de Torres y

One of the eight-foot cannons being raised from the wreck of the Spanish nao *Angustias*.

Morales, a hurricane was already in full force over 1000 miles away, and his fleet lay directly in its path. Two days from port the seas became listless and the skies took on an ominous hue of an impending storm. The general ordered his fleet to make a course change that would take them back to Havana, but it was too late — the hurricane was upon them. Of the 21 ships of General Torres' fleet, only one remained afloat when the hurricane passed. The other ships were scattered along the reefs and shallows of the Florida Keys, from Key Vaca (Marathon) to Largo Cayo (Key Largo).

Eventually two of the merchant ships were refloated and returned to Spain. For years many historians held the opinion that the *Angustias* was also refloated and returned. Of the ships that were known to have swamped and sunk on the reefs, treasure divers have systematically located and salvaged their remains. From the ballast piles of the *El Infante*, *San Jose*, *El Capitana*, *Herrera*, *Chavez*, *Tres Puentes*, *San Pedro*, *San Fernando*, *Arizon*, *El Populo*, *San Francisco*, some of the greatest Spanish treasures and artifacts have been recovered. Because of conflicting records and the great numbers of shipwrecks on the Florida reefs, not all of the 1733 fleet of treasure ships have been accurately identified or located. Great treasures are still to be recovered from the ballast mounds.

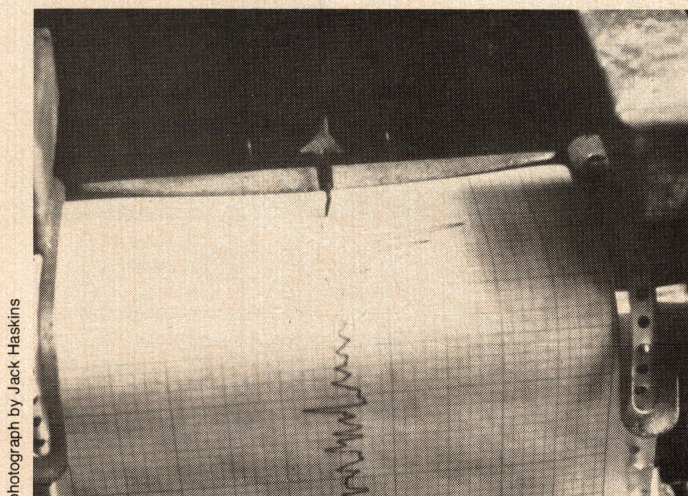
Recently two dedicated treasure divers, Jack Haskins and Dick MacAllaster of the Florida Keys, used the poem and other information gleaned from the archives in Seville, Spain, to locate the final resting place of the *Angustias*. It was a difficult task and Jack was to travel to the archives in Spain five times before he had the pieces of the puzzle put together.

The pages of letters and documents, in their original Spanish form, began to tell Jack the tragedies that befell the 1733 treasure fleet. Deciphering the names of the ships from their alias tag was difficult because oftentimes they were referred to by the names of their captain or their home port, and more often than not by some romantic name. The ship that Haskins and MacAllaster decided to go after was nicknamed the "Grand Coastal Trader," "Charanguero Grande," and listed as the "Nuestra Senora de las Angustias San Rafael." The owner and captain was D. Francisco Sanchez Madrid.

Why this ship? Well, the major reason was that because of the similarity of ships names returning to Cadiz in that year 1733, historians and treasure hunters were confused into believing that this ship had been refloated. As a result no con-

one mile square and directly in the channel of swift water running under the Long Key bridge.

The search was complicated by the swift current, murky water, and uneven bottom with uncharted coral heads. But even as the search got underway, anomalies (electronic "hits") began to register on the magnetometer. Metal lobster pots were responsible for the initial readings, but as the *Trident* swung near the shadows of the bridge, (as Haskins later described) "A lot of garbage began to show up on the magnetometer, and at first we thought it was just discarded junk from the bridge construction. Actually, it was parts of our wreck, but we didn't know it then. On the fourth pass along one grid pattern we suddenly got a tremendous anomaly that seemed to cover an area over 100 feet long. At that point we



photograph by Jack Haskins

A tremendous anomaly registered on the magnetometer when the *Angustias* was located.



photograph by Jim Janda

A silver dinner bell was one of the many historic treasures found on the *Angustias*.

certed effort was ever made to locate the remains. One of the pieces of the puzzle that led the two divers to the *Angustias* was the few words in the poem by Valasco — "Until the side was dented with rage, and such fury that the valiant keel broke." Knowing that the keel was broken, there would be no hope of refloating or saving the *Angustias*. Even though there are six maps indicating locations of the ships of the 1733 fleet, each pinpointing a different area, Jack was confident he had positive identification and location of the *Angustias*.

The next step was for Dick MacAllaster to make the trip to the State Capitol in Tallahassee. There he applied for an exploration contract to the Bureau of Historic Sites and Properties, Division of Archives History and Records Management, Department of State. By September 18, 1972, the state had granted an exploration contract to "Peninsular Exploration and Salvage Co.," the joint venture that Dick and Jack were to operate under. Financial backing came unexpectedly from local Marathon financier Rex DeRosay, who equally believed the treasure was there, and that these two divers would find it.

Within a few days of receiving the contract the project was underway. In the 38 foot Matthews converted charter boat *Trident*, Jack and another local diver, Jim Jones, left the Toll Gate Inn dockage at Lower Matecumbe for the search area 15 miles down the Keys. First they carefully laid out a grid with buoys in the area of prime suspect. As they headed into the search area they strung out their magnetometer, an electronic bug that could detect small metal objects near the bottom, but more importantly, it could detect larger objects buried deep in the sand. The search area was approximately

didn't know where to throw our marker buoy; it just seemed to be all around us." A quick dive to the bottom in 12 feet of murky water and the *Angustias* was located! The entire search from dockside to tying the marker buoy to one of the giant anchors had taken less than five hours.

In the weeks that followed the request was granted by the state for the group to dig an exploratory trench and two test holes in the ballast to help make a positive identification of the ship. Anchors sometimes help in identification, and there were four huge ones laying on the seaward end of the ballast mound, as well as two cannon laying off to one side. These indicated that the wreck was about the right time period, but more proof was needed before the divers could commit themselves to many hours on the bottom in a salvage operation.

The first test hole near the bow produced very little to indicate the ship's identification. The second test hole at the edge of the ballast pile nearest the bridge produced a number of rosary beads and some pottery shards. This left only the test trench across the stern by which the divers could make a decision. Halfway across the stern they got their answer: a single gold two escudo coin, not quite the size of a nickel, unmistakably 1724-27, and in excellent condition.

The salvage contract was granted Peninsular Exploration and Salvage in December and in those winter months many plans were made to systematically work the shipwreck. Don George, co-owner of a 60 foot converted shrimp trawler, *Geo-Search*, was summoned from the Padre Island treasure hunt off the coast of Texas. Other divers, cleared by the state, were contacted for diving duty. The ballast mound measured



photographs by Mike Cassaday



95 feet by 35 feet and an average of 4 feet high, represented about 400 tons of smooth river rock that had to be moved by hand. Much of this was welded together by iron fittings from the ship. In addition, the strong current and murky visibility presented problems not normally encountered by treasure divers in Florida waters.

The salvage operation began within sight of thousands of Florida tourists along US Highway 1 less than half a mile away. Greyhound bus drivers could be heard directing the attention of their passengers to the "treasure salvage boat anchored on your left, bringing up gold doubloons and pieces of eight from the remains of an old Spanish shipwreck!" The first few weeks of hard work seemed to bear out the drivers' prophesy. First, a silver dinner bell emerged from the ballast pile, then an emerald, an unbroken Kang Hsi China cup that miraculously escaped the ravages of shipwreck, and many silverplated rosary beads. And once a jade Buddah tumbled from the silt.

One day a diver came up the boarding ladder grinning from ear to ear, a pewter jewel box tucked under each arm. A crowd of divers gathered around the after hatch cover of the *Geo-search* as the lids of the boxes were gingerly pried open. Each box contained a string of rosary beads, tremendously



photograph by Author

"With a thousand gifts, 40 hours and 30 leagues, they saw her pilgrim. The advance was not great because overcoming risks were present, already shown in the sky, which appeared as a diamond tierra. It was 2 am Tuesday night when the storm broke. So in the torn dark mouth of the Bahama Channel, with yawning to swallow wants the same it provokes, in seething caldrens its raging torrents, in whose horrible gloomy shadows I will relate the torment of my Angustias. . . . Flee afflicted, but from whom do you run if the violent hurricane stays with you? Very well the region, whips the wing, swells the water, the waves crash and the tempest increases as hell breaks loose.

significant in historical value. Near the area of the jewel boxes divers recovered a great many pewter crosses and a silver locket with a glass front encasing what may turn out to be a painting of the Madonna.

As the ballast stones were removed from the stern section, another cannon was uncovered. Jimmy Jones, one of the divers, had been chipping away one morning at what he described as a "pretty big cannonball near the bottom of the ballast pile" when Dick MacAllaster pointed out that it was the cascabel of a cannon. He had uncovered the muzzle on the other side of the pile! Near the seaward end of the ballast Don George recovered a silver belt buckle and another diver came up with a pewter spoon with a bone handle. Toward the stern some silver pieces of eight were recovered.

Overall, the wreck was producing some significant finds, but excitement reached a climax when the box was located! Silver coins were transported aboard the galleons in wooden boxes, each containing approximately 3000 pieces of eight. Each piece of eight contains one ounce of silver. When the box was uncovered at the bottom of the ballast pile nobody could move it! It was 20 x 16 x 14 inches, and later weighed out at 236.6 pounds. The box was pried from the ocean floor and



"The whirlwind continued in gusts to cruelly buffet the foretop-sail, and its topgallant the topmasts and the sharp pine bows and the yard snaps and the mast sail and yard become entangled in a fatal forelock, figure of a woman, which makes the sound wind. Ranging from this jumble is maintained, when the broken sail is taken down, and in prompt repair which takes place, the wise attention subtly vacillates by inept practice and finally the mist takes the sail . . . Thus died her hope, thus ended, now the helm governs no longer and at the mercy of the wind she turns without steerage or lantern, or compass."

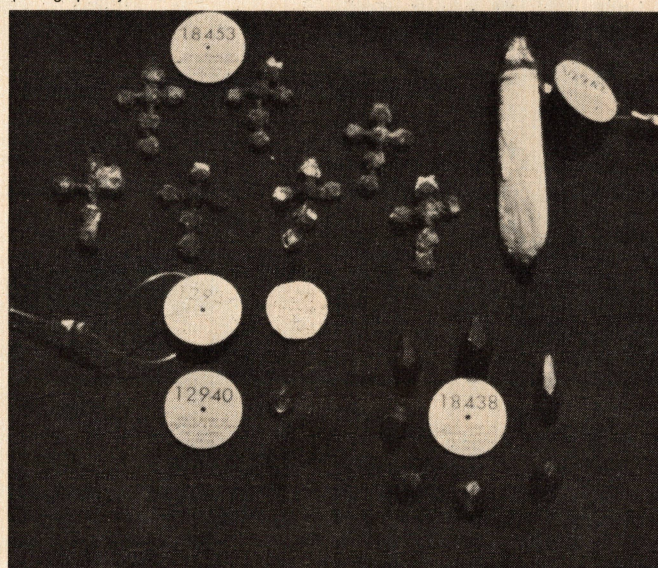
hoisted to the deck of the *Geo-search*. At this point the state representative, Larry Murphy, stepped in and the box was whisked away to Tallahassee — unopened! The contents will be a cliff-hanger until division time.

After discovery of the box, the flow of artifacts seemed to stop like a bad omen. Here and there a few buttons or lead musketballs were found. Cannonballs seemed to turn up everywhere, but nothing to ring the treasure bell with. At that point we began to notice the fish around the wreck. Where they had been taken for granted before, they now emerged with characters of their own. They had gotten used to us, and were constantly crowding around the airlift, waiting for a free meal of sea worms. One diver, while working near the bow, heard a sound resembling a ship rubbing up against some rubber tire pilings at dockside. Peering over his shoulder he saw a 400 pound jewfish with his head and gills inside the huge upright anchor ring, rubbing his back scales against the ring, not unlike an itching horse and an old post fence.

For long-haired divers, the gray angelfishes gave some spine tingling moments as they would sneak up behind the unsuspecting diver and pull at the hair streaming in the current. Small damselfish would swim out of nowhere and nip at an



photographs by Jim Janda



exposed ankle or elbow. Several large barracuda floated over the work like supervisors, peering over the divers as if to make sure they were getting the job done.

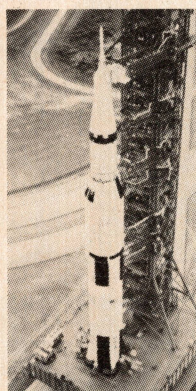
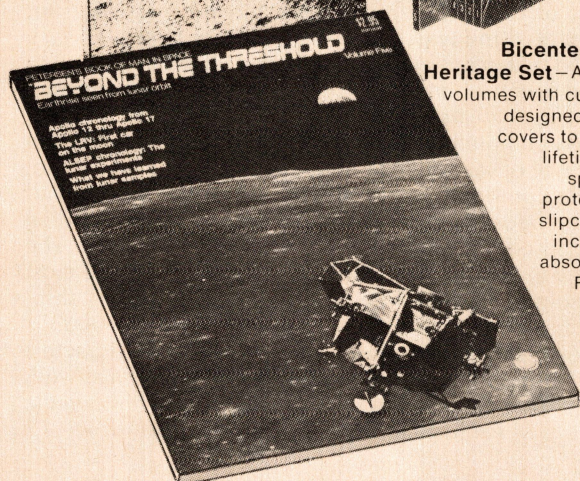
Other than a metate, a three-legged stone stool used to grind corn and grain, nothing further of significant value was found as the last of the ballast rocks were moved from the site. Everyone tagged the wreck as being cleaned. However, Jack Haskins had that peculiar sense about last inspections, and as he checked over the bottom near the shoreward side of the pile he noticed a small hole, not quite a foot in diameter, that hadn't been completely cleaned out. As he fanned away the covering layer of sand his eyes became big as saucers. There, stuck to the coral bottom of the hole, was a beautiful round gold four escudos! After several careful moments of chipping away, he carried his prize to the surface with a "Yippee!" The coin proved to be a 1732 Royal four escudos, the single most valuable coin to be found to date on any of the 1733 shipwrecks. It has been conservatively valued at over \$8000.

The wreck site is now abandoned to the fish characters which will miss all of us, I am sure. We will miss them as well, but we will treasure the hours and days we spent on this wreck, with the turn of each stone promising a new reward. 🐟

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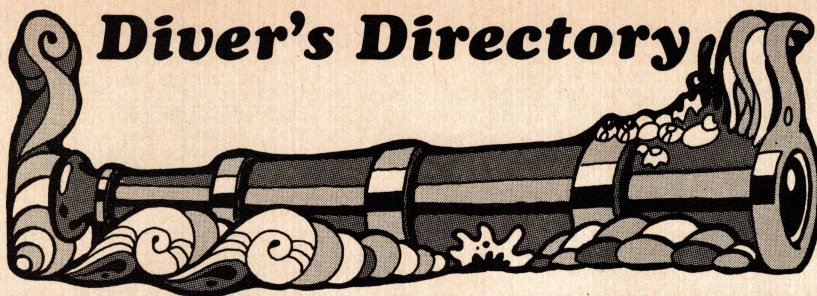
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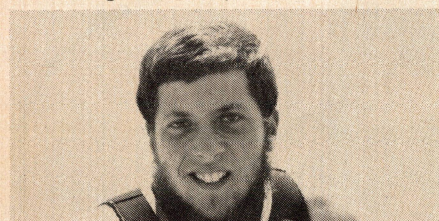
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STEVE BARSKY WITH NAUI

NAUI Headquarters has announced the appointment of Steve Barsky as program manager of the NAUI Diving Association (NDA). Steve is a graduate of the NAUI Instructor Certification Course (ICC), held in San Diego in 1970. Since that time he has participated in the NAUI Industrial Orientation Course, the Bio-Marine Exploration Seminar, and has been a staff member at three NAUI ICC's and at the Santa Barbara NAUI Diver Lifesaving Workshop.



Steve has worked in the retail diving business for over five years, and as a guide and instructor at the International Underwater Explorers Society (UN-EXSO) in the Bahamas. As program manager for NDA, Barsky will be responsible for administration of NDA diver training programs and member services.

YMCA SCUBA ENVIRONMENTAL RATING PROGRAM

There are a number of circumstances under which a person might be responsible for a diver he doesn't know, such as when a charter boat captain or resort dive guide takes a guest diver out. In order to assist these professionals, and to help divers establish their level of competence, the YMCA has developed the Scuba Environmental Program. Ten open water dives are logged by a YMCA instructor on the YMCA's new Scuba Environmental Rating Card, as to the type of dive, site, depth and date.

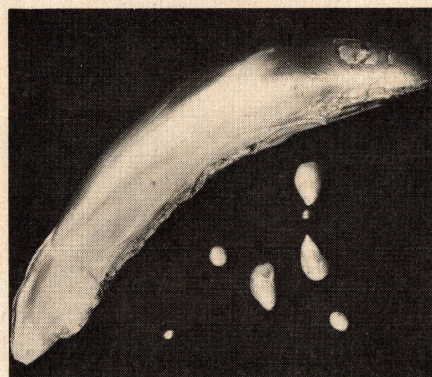
Only YMCA certified scuba instructors may conduct the Environmental Rating Program, but any diver can take advantage of the program who has completed a basic scuba course from one of the nationally recognized instruction agencies. For further information contact: YMCA National SCUBA Headquarters, 1611 Candler Bldg., Atlanta, Georgia.

ABALONE PEARLS

BY JOHN S. MILNE

I wonder how many divers who are fortunate enough to live in northern California, and who probably have a garage full of abalone shells, ever found an abalone pearl. Perhaps many divers after a long dive, and a longer drive, probably do not prolong the job of cleaning abalone any longer than is absolutely necessary. I used to dispense with them very quickly myself. That is up until about six years ago when I accidentally ruptured the stomach of an abalone while cleaning it, and discovered a small pearl inside. It was lustrous, beautiful, almost perfectly spherical, and about an eighth inch in diameter.

Over the years I have found seven more pearls ranging in size from 1/16 of an inch in diameter to the largest measuring 4 5/8 inches in length and 7/8 of an inch in diameter at its thickest part. The dictionary defines this large pearl as a "Baroque" because of its irregular shape. The same abalone that yielded the Baroque also produced three teardrop shaped pearls.

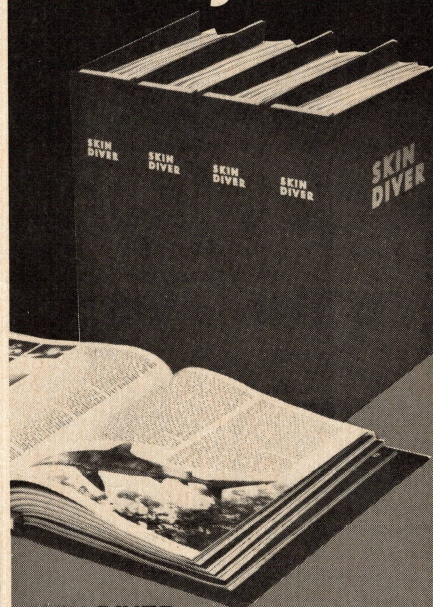


Lustrous, beautiful pearls can sometimes be found in digestive tracts of abalones.

Practically all of the pearls I have collected so far, including the large one, have been free pearls which I have found in the digestive tract of the abalone. So now I make it a point to check the stomach of every ab for pearls. I have seen many "blister pearls" which form on the inside of the shell as a protection against borers. It seems that these blister pearls only have a thin layer of nacre and are easily broken. However, I suppose with the right tools and knowledge they could be removed without damage.

I don't really know if any of the pearls I have collected so far have any value. I have shown them to retail jewelers and manufacturers of jewelry, and they say the pearls have little value except as a novelty. However, the jewelers claim that they would have some value if they were spherical (which is rare) and did not have blemishes, but they could never compare with the beauty and lustre of an oyster pearl. So far, their biggest value has been as a conversation piece of interest to divers and non-divers alike.

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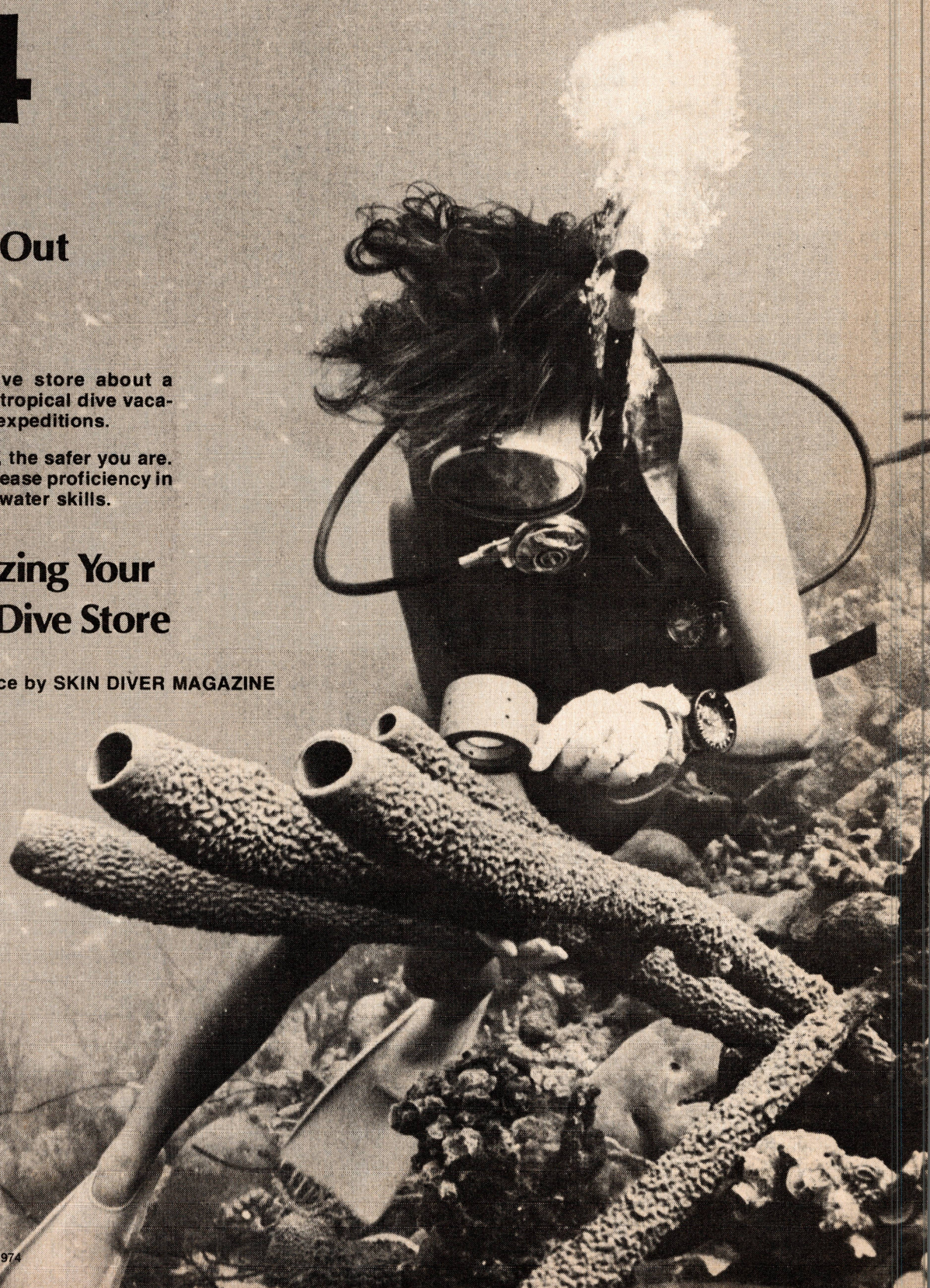
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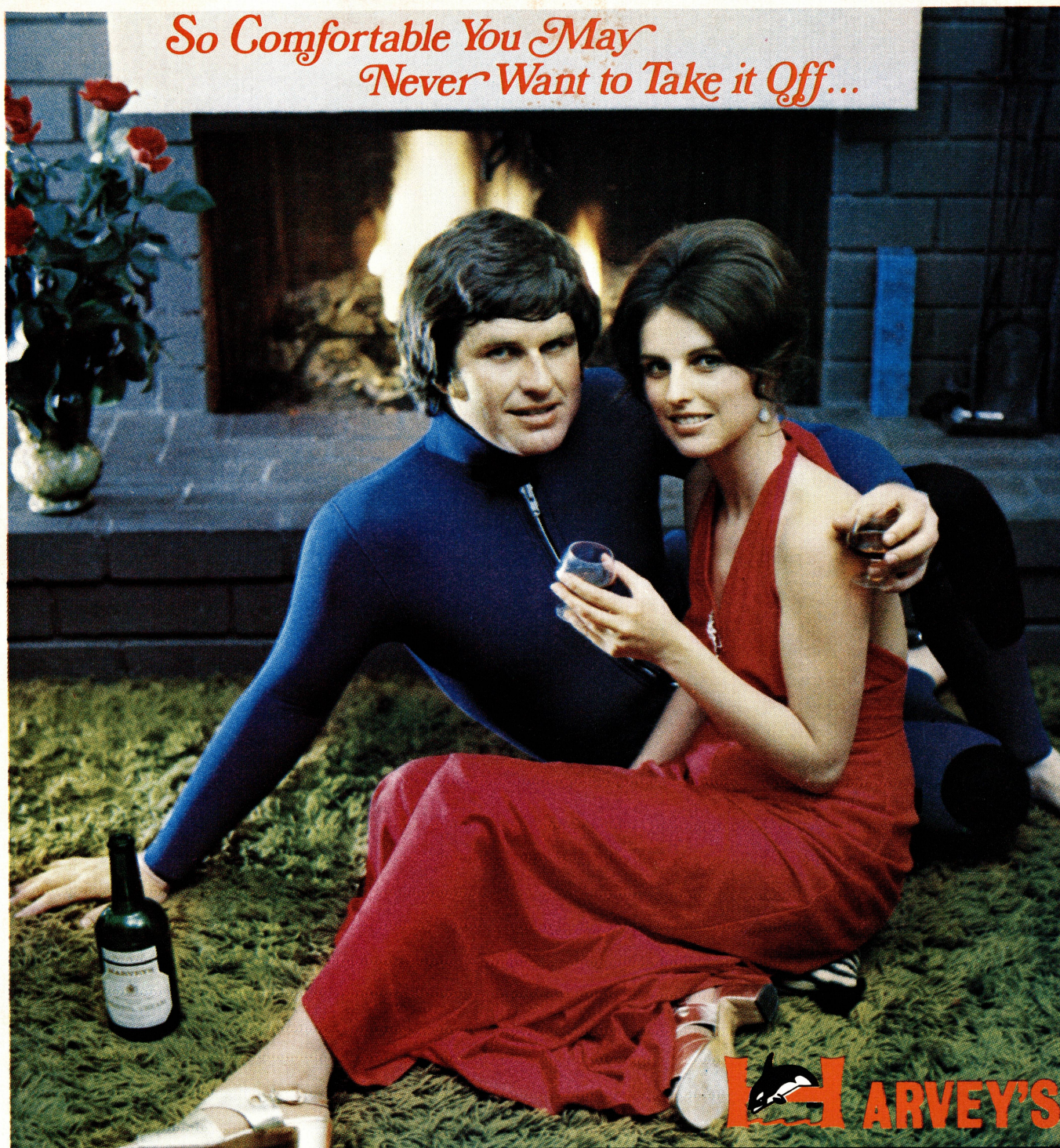
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